Journal
OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION

M

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Editorial

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Vol. 135 **December 15, 1959** **No. 12**

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Journal of the American Veterinary Medical Association

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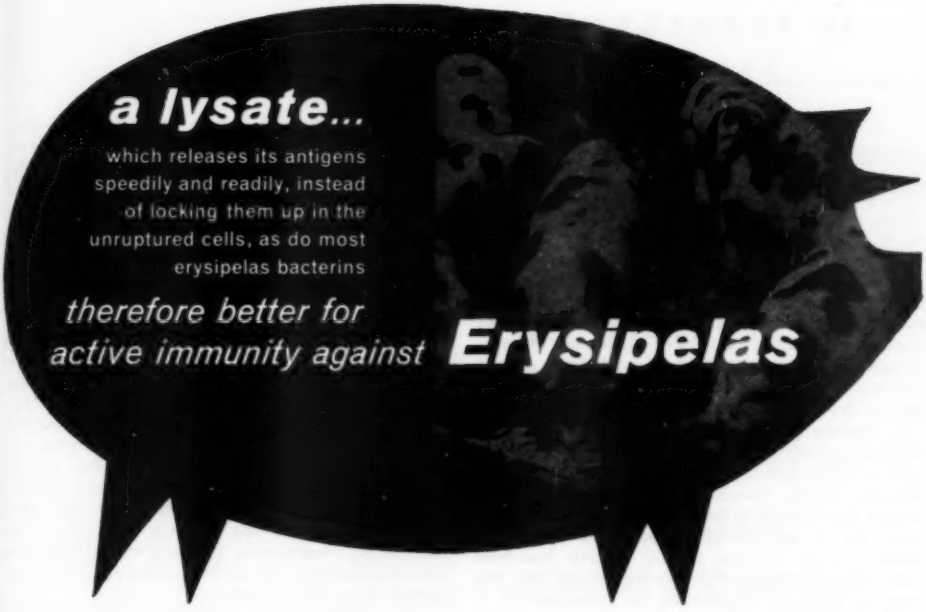

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Correspondence

November 16, 1959

Dear Sir:

Misconceptions have appeared in some of the recent veterinary literature concerning the use of succinylcholine as an equine anesthetic agent. The drug preparation is not an anesthetic inasmuch as pain or sensory perception is not obtunded in the least. Because an animal is incapacitated following the administration of the drug, it should not be construed to indicate a state of anesthesia. Pharmacologically, succinylcholine is a skeletal muscle relaxant by virtue of its ability to maintain a persistant depolarization at the motor end-plate.

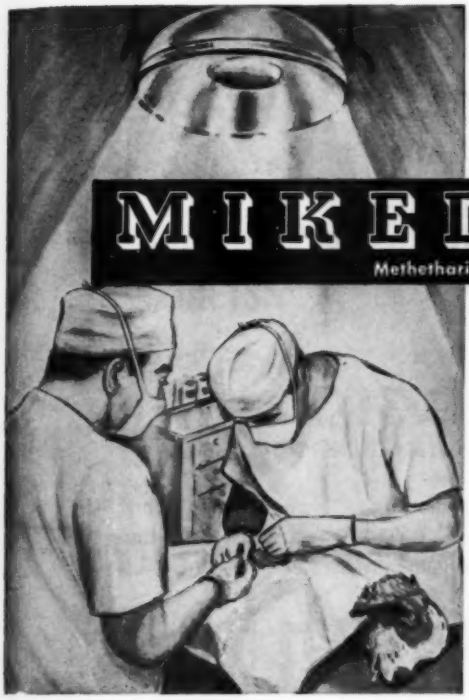
In casting and restraining the horse with succinylcholine chloride, the current practice of administering large dose levels of the drug needs revision. Some veterinarians report using intravenous dose levels as high as 250 to 300 mg. per 1,000 lb. of body weight. Respiratory muscle paralysis lasting as long as five minutes has been reported following the administration of this quantity of drug. Apparently no consideration is given to the hypoxic injury that may result during this period of apnea. It is known that the above mentioned dose level of succinylcholine is approximately three to ten times greater than the level (30 to 90 mg./1,000 lb. of body weight) required to produce skeletal muscle paralysis (Belling, T. H., Jr. and Booth, N. H.: *J.A.V.M.A.*, 126, (1955): 37-42). Similar findings have been reported by C. M. Stowe (*Cornell Vet.*, 45 (1955): 193-197) using the chloride form and by C. H. Hansson (*J.A.V.M.A.*, 128, (1956): 287-281) using the iodide form of the drug preparation. According to Stowe, the intravenous toxic level of succinylcholine choride for the horse ranges from 227 to 455 mg. per 1,000 lb. of body weight. In exceptional instances, Stowe observed that animals may regain respiratory function and recover from higher dose levels (590 mg./1,000 lb. of body weight). However, these dose levels are not recommended since injury from hypoxia is quite likely to develop, especially myocardial and cerebral damage.

Strong evidence that large doses of succinylcholine are responsible for producing deleterious effects in the horse appeared in a recent publication by L. H. Larsen and associates (*Austral. Vet. J.*, 35, (1959): 269-275). Accounts received by Larsen and co-workers from practicing veterinarians in the field indicated that death could occur as soon as ten seconds following the intravenous injection of succinylcholine and as long as 30 minutes following assumed recovery from the drug. They also obtained information from horse trainers that horses castrated under the influence of succinylcholine seemed to lose some of their racing form. In 2 such animals which had electrocardiograms recorded before castration, atrioventricular block and T-wave changes were found three to four months following recovery from the surgical operation. It was noted that the subsequent racing ability of these animals was not as good as it had been before the castration.

Following such unfavorable field reports, Larsen and co-workers decided to determine the effects of large dose levels of succinylcholine upon the horse. In using intravenous doses of 0.5 mg./kg. or 227 mg./1,000 lb. of body weight (3 times the normal amount required to cast the animal), electrocardiographic recordings revealed the presence of myocardial damage. In addition, postmortem examination constantly showed the presence of petechial and "wire-brush" hemorrhages in the right ventricular endocardium. They emphasized that the intravenous dose of succinylcholine should be kept to a minimum and the importance of using a dose level which would not produce paralysis of the respiratory musculature. In the event of paralysis, the administration of artificial respiration was suggested to prevent hypoxia.

In summary, two points should be repeated: (1) succinylcholine chloride should not be confused with an anesthetic agent since the preparation is a skeletal muscle relaxant and; (2) large dose levels of the drug that are in current use should be avoided to prevent possible myocardial and cerebral damage.

s/N. H. BOOTH
Department of Physiology
College of Veterinary Medicine
Colorado State University
Fort Collins, Colo.



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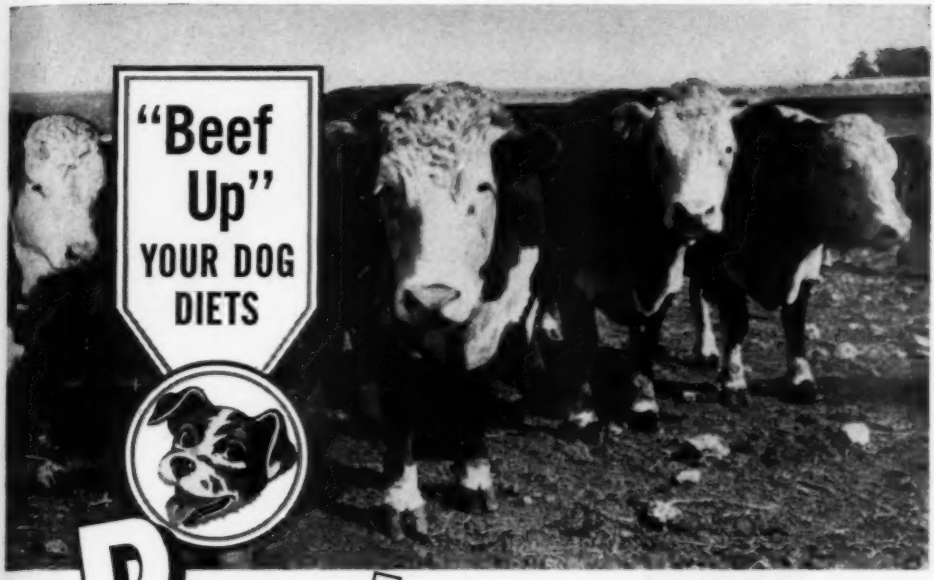

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news from Washington . . .

FROM THE AVMA WASHINGTON OFFICE

LEGISLATION

Senate Finance Committee Hearings Published

The hearings held by the Senate Committee on Finance on H.R. 10 (Keogh-Simpson) S. 1979 (Smathers) Self-Employed Individuals' Retirement Act of 1959, during First Session, 86th Congress (*see Journal*, Aug. 15, adv. p. 16), have been published. Since the Committee did not report on the proposed legislation prior to adjournment, it is hoped the report will be submitted to the Senate early in the Second Session, 86th Congress, which convenes Jan. 6, 1960. Members of the Senate Finance Committee are: Harry Floyd Byrd, Chairman; Robert S. Kerr, Okla.; J. Allen Frear, Jr., Del.; Russell B. Long, La.; George A. Smathers, Fla.; Clinton P. Anderson, N.M.; Paul H. Douglas, Ill.; Albert Gore, Tenn.; Herman E. Talmadge, Ga.; Eugene J. McCarthy, Minn.; Vance Hartke, Ind.; John J. Williams, Del.; Frank Carlson, Kan.; Wallace F. Bennett, Utah; John Marshall Butler, Md.; Norris Cotton, N.H.; Carl T. Curtis, Neb.

Experts Discuss Tax System Improvement

House Ways and Means Committee (Honorable Wilber Mills, Chairman) began public hearings in the form of panel discussions Nov. 16, to determine ways our federal income tax system can be improved. The panels consist of tax experts from the professions, business, labor, agriculture, research organizations, and colleges and universities. Hearings, which will continue into December, are the first phase of the Committee's study of tax reform. These hearings are exploratory in character and are intended to determine practical possibilities of establishing a broader income tax base and lower rates. The panel will touch on following items: deductibility of doctor bills, retirement plans, fringe benefits (including health insurance), taxation of scientific and tax-exempt organizations, travel and entertainment expenses, etc. Chairman Mills said no legislative program will be undertaken until all interested persons have been afforded an opportunity to express their views in public hearings.

MISCELLANEOUS

Five Veterinarians Commissioned into PHS

The following doctors of veterinary medicine were recently commissioned into the Regular Corps, PHS: Lionel Rubin, Rex Every, Charles McPherson, Gerald Van Hoosier, and John Holman.

Dr. Winchell Craig Joins HEW

Dr. Winchell McK. Craig, former professor of neurosurgery of the Mayo Foundation, University of Minnesota, has been appointed special assistant to Arthur S. Flemming, Secretary of Health, Education, and Welfare. Dr. Craig succeeds Dr. Aims C. McGuinness who resigned.

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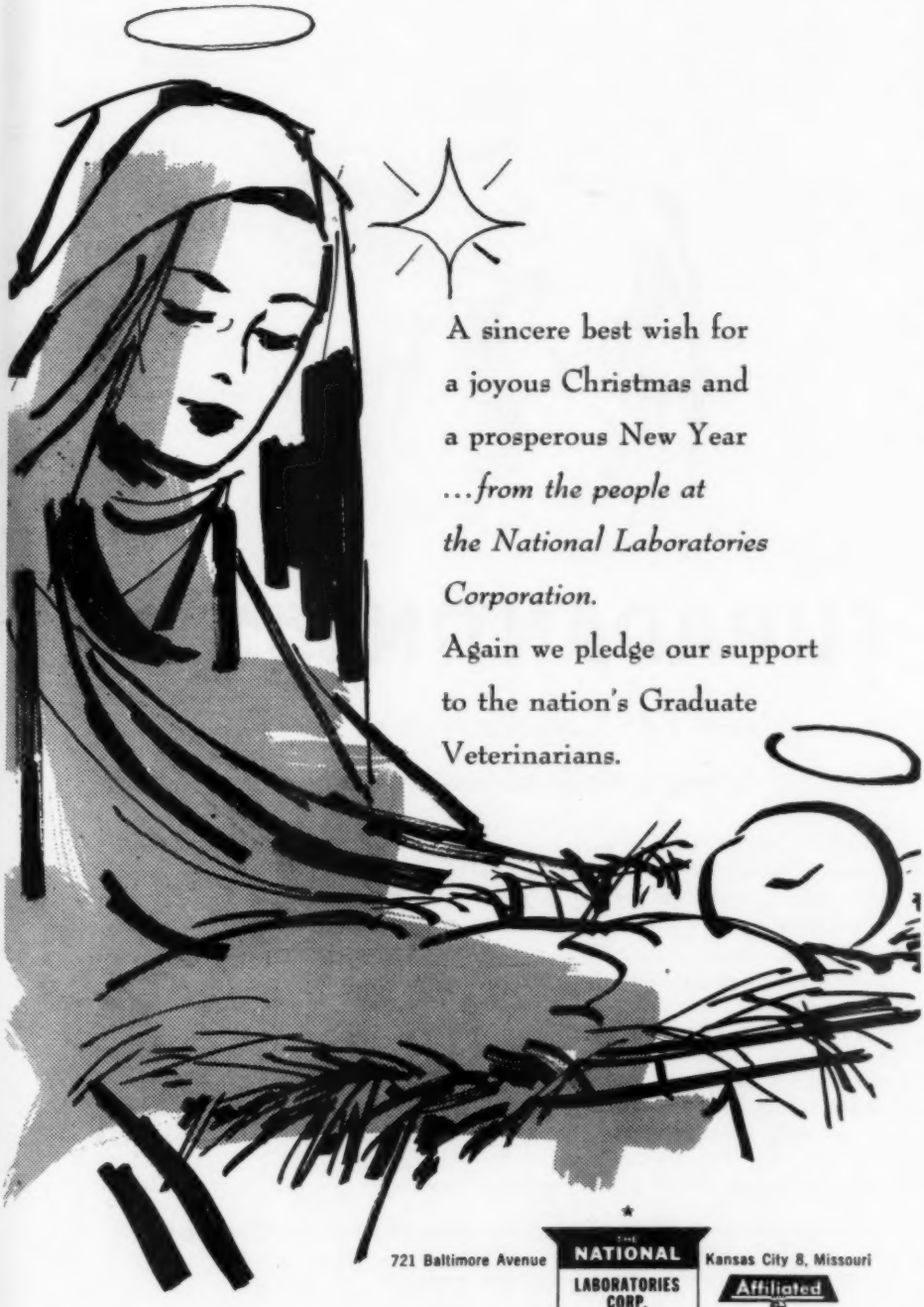

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REFERENCES: 1. Mosier, J. E., and Coles, E. H.: Vet. Med. **53**:649 (Dec.) 1958. 2. Belloff, G. B.: Calif. Vet. **9**:27 (Sept.-Oct.) 1956. 3. Mosier, J. E.: Vet. Med. **52**:445 (Sept.) 1957.

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1. Osborne, J. C. *in* New Horizons in Chemotherapy. Proceedings of First Regional Conference on the Nitrofurans in Veterinary Medicine. In press.
2. Bull, W. S.: N. Amer. Vet. 38: 3 (Jan.) 1957.

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1. Jones, S. V.; Belloff, G. B., and Roberts, H. D. B.: Vet. Med. 51:413 (Sept.) 1956.

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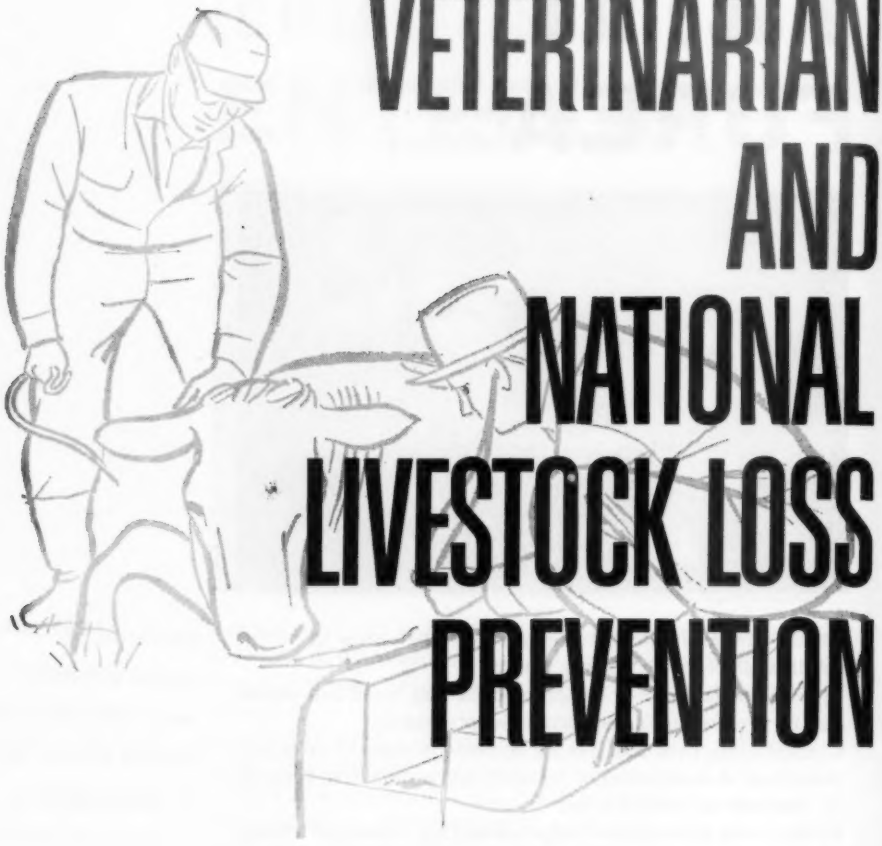

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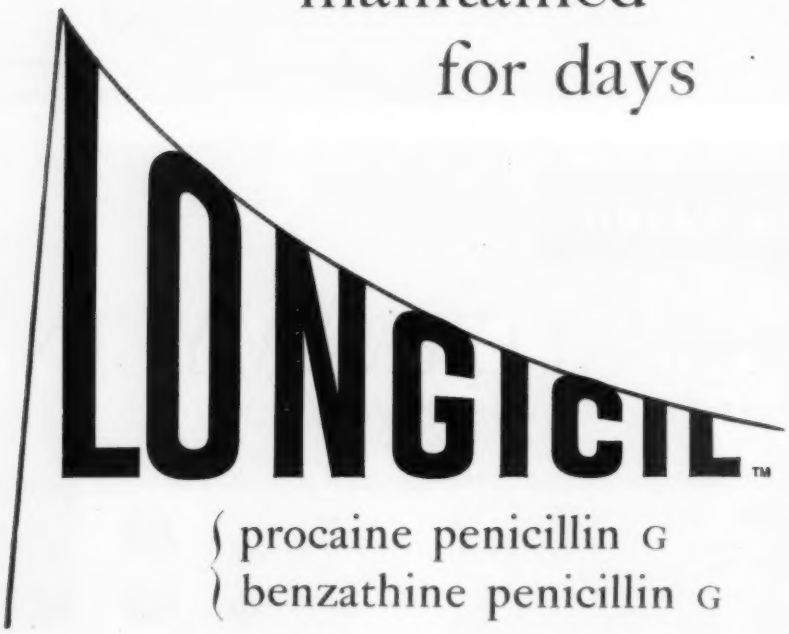

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JOURNAL
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Established January, 1877 Chicago 5, Illinois

Vol. 135 December 15, 1959 No. 12

Treating Salmonellosis in Swine with Neomycin

H. C. H. KERNKAMP, D.V.M., M.S., and R. K. LINDORFER, Ph.D.

St. Paul, Minnesota

VETERINARIANS ADMINISTERING to the diseases of swine are often called upon to treat enteric diseases of microbe origin. Salmonellosis (infectious necrotic enteritis) is the most common of the bacterial enteric diseases in swine. Since sulfonamides and antibiotics became available, the treatment of these diseases can be more specific and more effective.

This paper deals with a study of a neomycin sulfate preparation, Biosol,* in the treatment of an inflammatory disease of the stomach or intestines, or both, that was induced by feeding broth cultures of *Salmonella choleraesuis* var. *kunzendorf*. The disease, as it occurred in the laboratory, was manifested by signs and lesions typical of those seen in acute and chronic salmonellosis as it occurs under field conditions.

METHODS OF PROCEDURE

The pigs used in the study were of different breeds. They varied in age between 9 and 12 weeks and in weight between 40 and 65 lb. They were in good health at the start of the study. All were vaccinated against hog cholera three to four weeks prior to the start of the experiments. A modified live virus vaccine and anti-hog cholera serum were used.

Forty-eight hour broth cultures of the organisms were mixed with the feed placed before the pigs on three successive mornings. A new or fresh supply was prepared each morning. To assure a relatively equal distribution of the organisms in the feed, the mixing was done manually. A measured amount of feed and broth culture were placed in a large bowl and mixed. The mixing was done by rubbing the feed and culture between the palms of gloved hands until the mixture had an evenly wetted and crumbly texture. The feed was a ration compounded from ground corn, ground oats, soybean oil meal, alfalfa meal, meatmeal tankage, and a mineral mixture. The pigs were fed this ration prior to its contamination by the Salmonella organisms and throughout the course of the experiment.

In order that the feed-culture mixture would be consumed each day, the amount prepared and fed was less than the pigs would regularly eat in four to five hours. Moreover, adequate feeding space was provided, so each pig had a reasonably equal chance to obtain its portion of the feed-culture mixture. The organisms in 1 cc. of the broth culture were counted, and calculations from the records of the amount of culture and feed consumed for three days showed that each pig ingested approximately 93 billion organisms. This was assumed to be a heavy exposure. The mixture was readily eaten on the first and second day but, on the third day, the last day of the exposure, more than ten hours lapsed before it was all eaten.

About the third day, it was evident that the disease was pursuing an acute course in some of the pigs and a subacute to chronic course in others. On the basis of these clinical differences, the pigs were assigned to two general groups, (1) acute cases and (2) chronic cases. These groups were further subdivided into lots for the purpose of treating with the neomycin

From the Division of Veterinary Pathology and Parasitology and Division of Veterinary Bacteriology and Public Health, College of Veterinary Medicine, University of Minnesota, St. Paul.

*Biosol is a soluble powder of neomycin sulfate (1 Gm. Biosol is equiv. to 22 mg. neomycin sulfate). Supported in part by a grant from the Upjohn Co., Kalamazoo, Mich.

preparation at different dose levels and by different methods of administration. With some lots the drug was mixed with the feed, with others it was dissolved in the drinking water, and with one lot it was administered as a drench via stomach tube. Measured amounts of the drug were added to measured amounts of feed and thoroughly mixed before feeding.

After the medicated feed was consumed, the regular diet was fed without the medicament. Steel drums fitted with automatic drinking fountains were used when the medicament was added to the water. It was possible by these procedures to obtain a daily record of the amounts of feed, of water, and of drug that was consumed, so that the drug intake per pig per day could be calculated.

The general condition and physical status of the pigs was recorded each day, beginning two or three days prior to exposing them to the infection and ending a variable number of days after they had recovered. In some cases, temperatures and leukocyte counts were obtained on several pigs in a lot before and after infecting them with Salmonella organisms. Of the 120 pigs started on these experiments, 4 resisted the infection and were eliminated.

In connection with the reporting of certain events inherent to the study, it is sometimes desirable to specify the time that lapsed between exposure to the infection and the occurrence of that event which, in this instance, might be the appearance of a first sign of disease, clinical improvement, death, etc. For this purpose, the third or last day of the three-day period of exposure, is used as the postexposure reference day.

RESULTS

On postexposure day 1, a few of the pigs ate or drank sparingly. Most of them were sick and remained recumbent much of the time. About the same situation prevailed on day 2. However, on day 3, a large proportion of the pigs (75 to 80%) ate and drank sparingly and were less depressed than on the two previous days. The stools were soft, but many pigs showed profuse diarrhea. The remainder were quite sick. As a rule, treatment was begun on day 4 with the acute cases and day 9 with the chronic cases.

Lot 1.—Eight pigs with acute salmonellosis were consigned to this lot at the beginning of the course of treatment, but only 5 survived. They were treated on an individual basis since they were eating nothing, taking only small amounts of water, and were weak and unable to stand. Each was given an aqueous solution of the drug via a stomach tube. The daily dose per pig was 5 Gm. of the neomycin sulfate preparation dissolved in 30 cc. of water. After five days on treatment, the pigs began to regain strength and to eat sparingly. Starting on the ninth day, the drug was mixed with the feed. For the next ten days, each pig was fed approximately 5 Gm. of the drug each day. From the sixth to the 14th day on treatment, noticeable signs of recovery were apparent. They were treated two more days and then released as recovered.

Of the 3 pigs which died, 1 died on day 4, 1 on day 5, and 1 on day 15. Although the latter pig lived 15 days after the exposure, it showed no real signs of improvement. A hemorrhagic gastroenteritis was the principal gross lesion found in all 3 pigs at necropsy.

Lot. 2.—The 9 pigs in this lot were acutely sick with salmonellosis when treatment was started on day 4, but not as prostrate as the pigs of lot 1. The drug was added to the drinking water at the rate of 20 Gm./gal. After five days on treatment, 7 of the pigs showed marked improvement. They were voiding normal stools, had good appetities, and were active and alert. The treatment was continued for another two days. Two pigs died, 1 on the day the treatment was started and 1 the following day. Both showed lesions of acute gastroenteritis.

A record of the water consumed for the seven days on treatment showed that the pigs drank an average of 0.9 gal./day; the drug intake, therefore, was 18 Gm./pig/day.

Lot 3.—All 9 pigs in this lot were sick with an acute enteric disease due to *S. choleraesuis.* Treatment with the neomycin preparation (30 Gm./gal. drinking water) was started on postexposure day 4. Two of the pigs died on the first and second days of treatment. At necropsy, both showed a severe inflammatory disturbance involving the stomach and intestines. Although the remaining 7 pigs made considerable progress toward re-

covery in four days, treatment was continued three more days, at which time they were discharged. The drug intake throughout the period of treatment average 27 Gm./pig/day.

Lot 4.—This lot contained 15 pigs affected with salmonellosis in a chronic form. On postexposure day 9, they were started on a course of treatment with neomycin in the feed. At this time, they were showing considerable diarrhea and weight loss, were eating sparingly, and were dehydrated. Each morning for ten days, the pigs were fed 75 Gm. of the neomycin preparation mixed with 7 lb. of feed. When this was eaten, nonmedicated feed was supplied to more nearly satisfy their hunger. After ten days, 8 of the pigs had shown marked progressive recovery and were discharged from the experiment. After the fourth day on treatment, these 8 pigs ate more of the medicated feed than did those showing less progressive improvement. The more vigorous pigs were probably getting about 8 Gm./pig/day; the weaker pigs about 1.5 Gm./pig/day. Treatment of the 7 weaker pigs was continued at a rate of 10 Gm./pig/day. Four of the 7 were discharged as recovered nine days later but 3 died. One died on postexposure day 14, 1 on day 15, and 1 on day 17. At necropsy, all showed a marked diphtheritic and necrotic inflammation of the cecum and colon.

Lot 5.—The 5 pigs in this lot had salmonellosis in a chronic form. They were fed the neomycin preparation at the rate of 5 Gm./pig/day. Four of the pigs showed no definite signs of improvement until the tenth day, then showed daily improvement until discharged seven days later. The fifth pig died from the disease 14 days after exposure.

Lot 6.—This lot contained 20 pigs with chronic salmonellosis. Treatment was started on postexposure day 9 using the drug in drinking water at the rate of 10 Gm./gal. approximately 10 Gm./pig/day. After three days on treatment, 16 pigs showed considerable improvement, and after three more days they were considered recovered. The amount of drug given the 4 pigs which improved less rapidly was then increased to 20 Gm./pig/day for another seven days. They were then discharged as recovered.

Lot 7.—The 20 pigs in this lot, sick with chronic salmonellosis were started on treatment on postexposure day 9. They were given the drug (20 Gm./gal.) in drinking water and, since they drank approximately 20 gal. of water per day, each pig was getting about 20 Gm. of the neomycin preparation a day. By the fourth day of treatment, the physical condition of 18 of the 20 pigs had markedly improved so that treatment was discontinued after six days. One pig was continued on treatment at 20 Gm./day for another seven days and 1 died on the tenth day of the treatment. Necropsy showed an extensive diphtheritic and necrotic inflammation of the cecum and colon.

Lot 8.—Twenty pigs with chronic salmonellosis were consigned to this lot and given 30 Gm. of the neomycin preparation in each gallon of drinking water. They drank more water than any other lot, so each pig consumed approximately 40 Gm. of the drug each day. All recovered after six days on treatment except 1 which was transferred into a sublot that was getting the drug at the rate of 20 Gm./pig/day. It was released as recovered after seven more days.

Lot 9.—The objective with this lot of 10 pigs was slightly different from that described for the previous lots. It was an attempt to use the neomycin preparation as a preventive medicament that could be mixed into feed contaminated with Salmonella organisms. The procedure was to mix 10 lb. of feed, 1,000 cc. of a broth culture of *S. choleraesuis* that contained 30 million organisms per cubic centimeter, and 90 Gm. of the neomycin preparation. The mixture was prepared fresh each day and fed for three successive days.

Five of the 10 pigs never showed physical signs of disease and were removed from the experiment on postexposure day 20. The remaining 5 pigs, on day 5, began to void semiliquid stools, had reduced appetites, and appeared sluggish and depressed. During the next three days, the clinical signs became more marked, and on the following day they were started on treatment with the neomycin preparation mixed with the feed at the rate of 8 Gm./pig/day. They were then discharged after five days of treatment.

DISCUSSION

The success of this study depended largely on producing, under our laboratory conditions, acute and chronic cases of salmonellosis (infectious necrotic enteritis)

which would be typical of the disease as it occurs in the field.

It was planned that the exposure to the infection should be greater and more concentrated than would generally occur under field conditions. It was estimated that from 82 to 105 billion organisms were ingested by each pig during the three-day exposure period. Experience with this organism had previously shown that, when pigs developed salmonellosis in a chronic form, the clinical course usually extended over a period of two or more weeks. It has also been observed that some pigs recover from this disease spontaneously. However, when spontaneous recovery occurs, the course is seldom less than two and one half weeks.

The pigs were observed daily for several days before exposure to the infection as well as throughout the exposure. Treatment and postrecovery periods and all changes were recorded. For three days prior to and six days following exposure, the temperatures and white blood cell counts were obtained on 4 pigs in lots 4, 6, 7, and 8. A rise in the temperature occurred on the third day of the exposure period; the average for the pigs examined was 105.7 F. It remained at about this level for two days, fluctuated slightly during the next two days, then returned to preinfection levels (103.0 F.).

The white blood cell count averaged 21,000/cmm. in the pre-exposure period. It increased to an average of 29,000 on day 2 and to 28,000 on day 3 of the exposure period. The counts after postexposure day 2 varied from 15,000 to 25,000/cmm. Four of the 16 pigs studied showed a decided leukopenia on day 2 of the exposure period, ranging between 4,000 and 7,000/cmm. By day 3, the counts had increased to between 19,000 and 24,000 and remained in this general range for the balance of the special study period.

It is commonly known that pigs sick with salmonellosis will drink but they will not eat. For this reason, when treating Salmonella-infected pigs, it is usually desirable to use a medicament that can be added to the drinking water. The powdered neomycin preparation used was first dissolved in a liter of water which was added to the larger quantity of water in the drinking fountains. The pigs drank approximately 1 gal./pig/day. The intake was less the first two or three days on treatment, but it increased as recovery progressed.

When the drug is mixed with the feed, it is important that the feed-drug mixture be thoroughly blended and that sufficient trough space or feeder space be provided so the pigs have a reasonably equal chance of obtaining their share. The two lots (lots 4 and 5) of pigs treated by this method made satisfactory recoveries. This method of treatment required a longer time, but less drug per pig per day than when added to the drinking water.

One group of pigs was so sick that they would neither eat or drink and it was necessary to medicate them individually, once each day for eight days, via stomach tube. When they were then eating, the drug was mixed with the feed. It is almost certain that without individual medication, none of the pigs would have survived. Thus, 62.5 per cent of the critically sick pigs were salvaged when the loss might well have been 100 per cent.

A comparison of the therapeutic results, when the powdered neomycin preparation was mixed in the drinking water at levels to equal 10, 20, and 40 Gm./pig/day (neomycin sulfate equiv. of 220, 440, and 880 mg.) and available to the pigs at all times for seven consecutive days, indicates that amounts much greater than 10 Gm./pig/day would be larger than necessary for pigs affected with chronic salmonellosis. Mixing the drug with the drinking water or with the feed did not seem to make them unpalatable. No signs of toxic effects or side-effects were noticed. Doses slightly in excess of 40 Gm. of the neomycin preparation (880 mg. equiv. neomycin sulfate) for six days did not cause recognizable injury nor were any harmful effects observed when the daily dose was 10 Gm. (220 mg. equiv.) for 16 days.

CONCLUSIONS

Acute and chronic cases of salmonellosis (infectious necrotic enteritis) were produced in healthy vigorous pigs by mixing broth cultures of *Salmonella choleraesuis* var. *kunzendorf* with their feed on three successive days.

The neomycin sulfate preparation (Biosol) used was effective in the treatment of induced acute and chronic salmonellosis.

Doses of 10 and 12 Gm. of the drug (220 to 264 mg. equiv. neomycin sulfate) per pig each day for six or seven days resulted in recovery of a high proportion of pigs severely affected with salmonellosis.

Salmonellosis in Sentry Dogs

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IN EARLY 1957, the base veterinarian, Chennault Air Force Base, requested assistance from the Louisiana State Board of Health in determining the cause of an enteric type of disease in sentry dogs housed at the base.

Varying degrees of pyrexia, anorexia, diarrhea, and bloody stools had occurred among the dogs periodically over a period of several months. There was a significant increase in case incidence following a period of cold, rainy weather in January, 1957. Treatment had consisted of streptomycin, penicillin, sulfonamide, nystatin, nitrofurantoin, and other therapeutic preparations depending on the clinical findings and, in some instances, on the laboratory findings of the base hospital laboratory. Evidence of infections with ascarids, hookworms, and heartworms had been observed in some of the animals.

Twenty-three dogs were quartered at the base at the time of the request. They were kept separately in outdoor wire runs, each with a built-in shelter house. The floors of the runs were constructed of concrete and provided with individual drains. Adjacent to these runs was a small building consisting of an office, an examination and treatment room, and a room containing two freezers for storing frozen horse meat. A closet in the building housed a small supply of a commercial dog meal. Approximately 50 ft. away from the structure was another building where a larger quantity of dog meal was stored. This building was heavily infested with mice and showed some evidence of rat infestation. Each dog had its individual food and water receptacle.

Since these animals had been trained to attack anyone other than their personal handler, only the latter could enter the runs. There was no contact between dogs except that which was possible through the common fence between adjacent runs. The dogs were normally removed from the kennels only for training and patrolling purposes and were always accompanied by their individual handlers. The source of the drinking water at the kennels was the Lake Charles city water supply. Feed consisted of a commercial brand of fresh frozen horse meat and a commercial brand of dog meal and cubes.

Preliminary bacteriologic examination of fecal specimens from 5 dogs on Feb. 8, 1957, revealed the presence of Salmonella in 3 of the animals. As a result of this finding, a bacteriologic examination of the feces of all 23 dogs seemed warranted.

METHODS

Between February 8 and 18, 28 specimens were collected from the runs of the 23 dogs under the supervision of the base veterinarian. (A repeat specimen was collected from five runs, which accounts for the excess number of specimens.)

All specimens were submitted immediately to the Lake Charles Regional Laboratory of the Louisiana State Board of Health where they were placed in glycerol-saline buffer solution. From each specimen, plates of SS, MacConkey, and bismuth sulfite agars were streaked, and a bismuth sulfite agar plate was poured. Approximately 3-ml. of each specimen was also placed in a tube containing 8 to 10 ml. of Kauffmann's modification of Mueller's tetrathionate broth.

After 24 hours' incubation at 37 C. in the tetrathionate broth, brilliant green, SS, and bismuth sulfite agars were streaked. Suspicious colonies observed on each of the above plates after 24 hours' incubation at 37 C. were transferred to triple sugar iron agar slants and incubated for 24 hours at 37 C. Growth from these slants showing typical Salmonella-like reactions (acid and gas in the butt; alkaline slant with or without H_2S) were planted in urea broth tryp-

From the Louisiana State Board of Health. Dr. Caraway is state public health veterinarian, section of epidemiology; Mr. Scott is laboratory administrator and Miss Roberts is a laboratory technician, Lake Charles Regional Laboratory; Dr. Hauser is director of the Division of Laboratories.

The authors are grateful to Lt. T. M. Richardson, base veterinarian, Chennault Air Force Base, Lake Charles, La., for his cooperation in this study, and to Miss Lucille Godelfer, assistant director of the Division of Laboratories, Louisiana State Board of Health, and her associates who confirmed and serologically typed all Salmonella isolations.

tone water for indole production and nutrient broth for potassium cyanide test. All cultures showing typical biochemical behavior for Salmonella were tested with Salmonella polyvalent and grouping antiserums. Cultures agglutinated by the antiserum, and cultures not agglutinated by the antiserum but showing typical biochemical behavior, were forwarded to the Central Laboratory of the State Board of Health in New Orleans, where final typing of the organisms was performed according to the Kauffmann-White schema.[1]

Where more than one isolate from the same dog was agglutinated by the same antiserum group, only one was forwarded for final typing. Subcultures of any unusual or questionable Salmonella types isolated were forwarded to a consultant* for further examination.

On June 10, 1957, fecal specimens were again collected from the runs and, in addition, rectal swabs were obtained. At the time of this survey, 24 dogs were housed at the base (2 new dogs had been added and 1 animal of the original group transferred). Fecal specimens were processed in the same manner described above. The rectal swabs, however, were streaked only on MacConkey agar plates and then were placed in tetrathionate broth. All isolations from each animal in this survey, regardless of the number agglutinated by the same antiserum group, were forwarded to the

*Dr. P. R. Edwards, Communicable Disease Center, Chamblee, Ga.

Table 1—Salmonella Serotypes Isolated from Sentry Dogs

	First Survey (Feb., 1957)	Second Survey (June, 1957)	
Name of dog	Fecal specimens	Fecal specimens	Rectal swabs
Flash	S. anatum	S. illinois	XXVIII:y (monophasic) S. illinois
Skipper	(Negative)	S. illinois	S. illinois
Baron*	S. minnesota		S. illinois
Toby	S. oranienburg S. newington	S. newington S. illinois	S. newington
Nix	S. montevideo	S. illinois	S. illinois
Vance	S. tennessee S. newington	S. illinois	S. illinois
Smoky (319)	S. paratyphi B S. newington	S. illinois	S. illinois
Shep	S. anatum S. montevideo S. derby	S. illinois S. derby	S. illinois
Val††		S. illinois	S. illinois
Smoky (621)	(Negative)	S. illinois S. barielly	S. illinois S. binza
Marco	S. paratyphi B	S. typhimurium	S. illinois
Rusty	S. montevideo S. newington	S. illinois	S. illinois
Dux	(Negative)	S. illinois	S. newington
Kaza	(Negative)	S. illinois S. derby	XXVIII:y (monophasic) S. illinois S. montevideo
Rex	S. montevideo S. paratyphi B	S. illinois	S. illinois S. cubana
Jube	S. minnesota S. newington	S. illinois	XXVIII:y (monophasic)
Keno††		S. illinois	Negative
Jack	S. barielly	S. illinois	Negative
Indy	S. infantis S. newington	S. illinois	Negative
Kirk	S. give S. paratyphi B S. minnesota	S. illinois	S. illinois
Smoky (896)	(Negative)	(Negative)	S. illinois S. kentucky
Major	S. paratyphi B	S. illinois	XXVIII:y (monophasic)
Daffy	S. paratyphi B S. give S. meleagridis	(Negative)	XXVIII:y (monophasic)
Rocky**	S. give	(Negative)	
Tino†	S. derby		

*Second survey fecal specimen not collected: **second survey rectal swab not obtained; †transferred—not included in second survey; ††new dog—not included in first survey.

Central Laboratory in New Orleans for final typing.

In view of the fact that some of the signs observed in the dogs were believed to be related to the presence of intestinal parasites, each fecal specimen collected from the floors of the dog runs in the second survey (June 10) was also examined for evidence of parasitic infection.

Inasmuch as the only human contact of each dog was its individual handler, a fecal specimen from each handler was collected on two different occasions and examined bacteriologically. The environment of each dog was thoroughly investigated. This consisted of attempting to isolate Salmonella from the floor of each run and from each dog's feed and water pans. In addition, because of the possibility of contamination by mice and rats, mouse feces collected from the floor of the feed storage house and small feed closet, and the intestinal contents of mice caught in the feed house and of 6 rats trapped on the premises were also studied bacteriologically.

A common food item was considered a likely source of the infections. Neither the commercial brand of fresh frozen horse meat, nor the commercial brand of dog meal and cubes used prior to the first survey was in stock. Three samples of the same brand of horse meat, however, were obtained from a local distributor. Approximately one month later, two additional meat samples were obtained, as well as two samples of the dog meal that was used prior to the first survey. Following the first survey but prior to the second, the rations consisted of a new brand of horse meat and a new brand of meal. One sample of the former and two samples of the latter were included in the bacteriologic study.

LABORATORY FINDINGS

In the first survey (Feb., 1957), of the 23 dogs examined, 18 (78.2%) yielded positive Salmonella cultures on at least one examination (table 1). Twenty-eight specimens were examined, of which 18 (64.2%) were found positive. Twelve different Salmonella types were identified among the latter. It was a common occurence to isolate two or three different Salmonella types from the same specimen.

In the second survey conducted on June 10, 1957, Salmonella organisms were isolated from 23 of the 24 dogs (96.8%), utilizing either fecal specimens or rectal swabs. Twenty-one (91.3%) of 23 fecal specimens were positive for Salmonella as were 20 (86.9%) of 23 rectal swabs. In this survey, ten different serlogic types were encountered.

The feces of 19 dogs contained hookworm ova, and 4 of these also contained ascarid ova. *Giardia lamblia* cysts were observed in the feces of 2 dogs, and the feces of the remaining 3 dogs were negative for evidence of intestinal parasites.

The two fecal samples examined from each dog handler, swabs taken from the runs and feed pans, water samples, mice feces and intestinal contents, and all food samples were negative for Salmonella organisms. The intestinal contents of the 6 rats, however, yielded *Salmonella thompson*.

DISCUSSION

The findings in this study are similar in some respects to those of various other workers interested in the general problem of salmonellosis in dogs. In this study, 18 different serologic types of Salmonella were isolated from the dogs in the two surveys. In a study of 100 dogs in Michigan,[4] 16 different serologic types were isolated from 18. From dogs examined in Florida,[3] 53 different types were found among 2,252 positive specimens. In this same study, 412 specimens yielded multiple Salmonella types.

In the present study, if the fecal specimen and rectal swab taken simultaneously are considered as a single specimen, 21 multiple infections were encountered out of a total of 52 specimens. Evidence that Salmonella infections in dogs are of relative short duration and that the animals are exposed to salmonellosis frequently is indicated by the multiplicity of serologic types encountered on repeated fecal examinations.[3] The data obtained in the present study point to the same conclusions. Of the 12 different serologic types encountered in the first survey, only four were encountered in the second survey conducted only four months later. In no instance was the same type isolated from the same dog in both surveys. *Salmonella illinois* was the predominant type encountered in the second survey. It was isolated from 22 dogs, but it was not encountered in any of the dogs in the first survey.

One interesting observation in the present study was the difference in laboratory findings obtained by fecal specimen examination as compared with rectal swab examination. Both sampling techinques were employed simultaneously with the exception of 1 dog (Vance), from which the fecal specimen was obtained four days after the rectal swab. In this case, however, the findings were identical. The results differed in 15 of the 22 dogs on which both techniques were employed.

Five rectal swabs yielded cultures identified by antigenic formula as monophasic XXVIII:y. These cultures were forwarded for identification. It was presumed that they were monophasic variants of either *Salmonella pomona* (XXVIII:y-1,7) or *Salmonella tel aviv* (XXVIII:y-e,n,z_{15}), but since phase two could not be isolated, they could not be assigned to either. Others[4] have also isolated a monophasic type with this antigenic formula from a dog. To the writer's knowledge, the only type isolated here which had not previously been reported in dogs was *Salmonella binza*.

CONCLUSIONS

The pathologic significance of these Salmonella infections for the dogs was difficult to evaluate. The over-all clinical picture was somewhat obscured by the presence of intestinal parasites and presumably by the alteration of the intestinal flora due to the liberal use of various therapeutic agents.

There was no conclusive evidence as to the source or mode of dissemination of the infections. A common contaminated food would seem to be a logical source, but our investigation of the food samples available yielded no conclusive evidence in this direction.

In previous studies of this kind, commercial foods have been shown to harbor Salmonella organisms. In the present study, 14 of the serologic types isolated from fecal specimen material were identical with those isolated from commercial meals by others,[2] who observed that, of 11 different brands of commercial dog meal, nine were contaminated with a total of 17 different serologic types of Salmonella. There was, in addition, no evidence found to incriminate other possible sources or modes of dissemination. *Salmonella thompson* cultured from the trapped rats was not encountered in any of the dogs and, therefore, the role of these rodents as agents of dissemination was thought to be negligible.

ADDENDUM

Subsequent to the submission of the above paper for publication, Dr. Paul J. Brandly, Chief, Biological Control Laboratory, Meat Inspection Division, Agriculture Research Service, Beltsville, Md., in a personal communication to the authors, reported the isolation of 13 serologic types of Salmonella from specimens taken in the plant that processed the frozen horse meat fed to the dogs in the above study. The most commonly isolated types were *Salmonella derby* and *Salmonella anatum*. Five of the 13 types, including the above two types, were identical to five types isolated from the dogs.

References

[2]Edwards, P. R., and Ewing, W. H.: The Kauffman-White Schema. In "Identification of Enterobacteriaceae." Burgess Publishing Co., Minneapolis, Minn. (1957): 52-60.

[2]Galton, M. M., Harless, M., and Hardy, A. V.: Salmonella Isolation from Dehydrated Dog Meals. J.A.V.M.A., *126*, (Jan., 1955): 57-58.

[3]Galton, M. M., Scatterday, J. E., and Hardy, A. V.: Salmonelloses in Dogs. I. Bacteriological, Epidemiological and Clinical Considerations. J. Infect. Dis., *91*, (1952): 1-5.

[4]Wolf, A. H., Henderson, N. D., and McCallum, G. L.: Salmonella from Dogs and the Possible Relationship to Salmonellosis in Man. Am. J. Pub. Health, *38*, (1948): 403-408.

Peritoneal Tympany in a Cow

An Ayrshire cow, 6 years old, in Britain, had a marked bilateral, symmetrical, abdominal distention. She ate hay and grain and ruminal contractions could be heard once per minute in the lower left flank. Her temperature was 102.8 F., her pulse 70 per minute, and her respirations were shallow. No gas escaped when a stomach tube was passed and, upon rectal examination, a gas-filled space was found between the rumen and the abdominal wall. Much gas escaped when a trochar was passed into the peritoneal cavity.

At necropsy, three chronic ulcers were found in the abomasum, two of which had been perforated but were covered externally by adhesions to other organs.—*M. P. Cunningham et al. in Vet. Rec. (April 4, 1959): 271.*

Surgery and Obstetrics
and Problems of Breeding

A Plastic Rumen Fistula Apparatus for Sheep—Its Insertion and Use

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RUMEN FISTULAS have long been of value in research, teaching, and veterinary practice. They were used in 1928 to study the physiology of the rumen.[5] Since then, rumen fistulas have been used for many purposes. Fistulas have also been used successfully in the abomasum, intestines,[2] and the esophagus.[1]

In the United States, most of the experimental work with fistulas in animals has been with cattle. In Australia, extensive work has been carried out with rumen, abomasal, and intestinal fistulas in sheep.[4]

The plastic rumen fistula apparatus (fig. 1) is put into the sheep in one operation. It has been successfully used in 50 sheep 2 to 8 years of age over a three-year period.

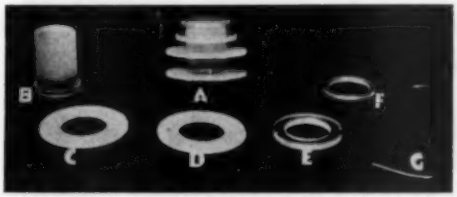

Fig. 1—Plastic rumen fistula apparatus and individual parts. (a) Apparatus assembled; (b) cannula, 2⅞ inches long, 2 inches outside diameter, ⅛ inch wall—threads extend 2 inches from top of cannula; (c and d) polyethylene washers, unthreaded, 4 inches diameter, ⅜-inch thick; (e) threaded washer, 3 inches diameter, ½-inch thickness; (f) screwtype cap, 2½ inches diameter, ¼-inch thick; (g) wire hook used for insertion of rumen fistula.

PROCEDURE

The sheep is restrained, in a standing position, in a crate with an adjustable stanchion-type head lock (fig. 2). The crate can be raised to a convenient level for the operator by placing it on a table or some other solid support. The animal should be taken off feed 14 to 16 hours before the operation. The wool must be clipped close to the skin over the left paralumbar region and the skin washed with soap and water, then disinfected with an approved disinfectant.

Adequate anesthesia can be obtained by the paravertebral block as described[3] for cattle, with 2 per cent procaine. This method gives complete relaxation of the abdominal muscles. Occasionally, it may be necessary to infiltrate 5 cc. of 2 per cent procaine under the skin along the line of the proposed incision. The area is then draped with a sterile towel on each side of the proposed line of incision. The skin is incised to approximately 4 or 4½ inches in length, starting 1 inch below the transverse process of the lumbar vertebrae, midway between the last rib and the tuber coxa (fig. 2). The incision should be as high as possible in the paralumbar region.

After the skin is incised, an opening is made through each layer of muscle, in the direction of its fibers, by blunt dissection. The opening should be approximately 1 to 2 inches longer than the diameter of the rumen cannula to be inserted.

The rumenal wall is picked up with Allison forceps toward the top of the dorsal sac and drawn through the abdominal opening. The rumen is then carefully incised only to a length equal to the diameter of

Fig. 2—Sheep restrained in a crate with stanchion-type head lock. The marked area over the paralumbar region outlines operating area.

From the Animal Disease and Parasite Research Division, Agricultural Research Service, U.S.D.A., Logan, Utah.

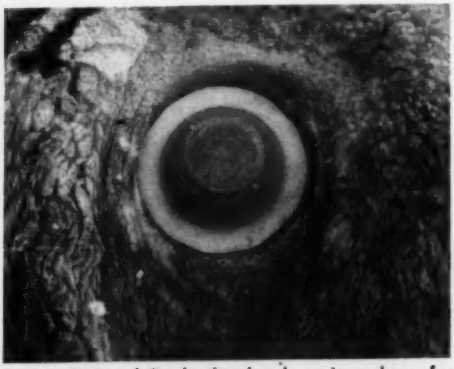

Fig. 3—Rumenal fistula that has been in a sheep for two years.

Fig. 4—Funnel to be inserted for feeding.

Fig. 5—Funnel has been inserted; substance is being poured directly into the rumen.

the cannula. The edges of the rumenal opening are then held upward by forceps attached to its edges. Allison forceps are placed across each end of the incision to prevent tearing of the rumenal wall when the opening is stretched as the cannula is slowly inserted, base end first, until it is completely inside the rumen.

A long wire hook is inserted through the top of the cannula and hooked over the lip of its base to hold it in an upright position inside the rumen. The inner washer is made flexible by heating it in hot water. It is then put over the outer end of the wire hook, folded in half, inserted into the rumen and over the cannula, and forced down on the base of the cannula. The cannula is then pulled up through the rumenal and abdominal openings, and the edges of the rumenal opening are then forced down around the cannula to the inner washer. Penicillin and streptomycin ointments are applied to the rumen and muscle layers. The cannula is pulled outward to force the rumen tightly against the inner surface of the abdominal wall.

By using this procedure, it is unnecessary to suture the edges of the rumen or the abdominal muscles around the cannula.

The cannula is forced to the dorsal end of the skin incision. Then, enough skin is removed from around the cannula so that the edges immediately below can be drawn together without causing rolls on each side of the cannula.

The skin incision is then closed with blanket or interrupted linen sutures. The suturing should be started at the lower end of the incision, forcing the cannula tightly against the dorsal end.

The outer washer and the threaded ring are then placed on the cannula and the threaded ring is screwed down, leaving the washer loose to allow for swelling. The following day, the outer washer is removed, the tissues around the cannula are cleaned, penicillin and streptomycin ointments are applied, and the washer is adjusted according to the swelling to prevent pressure on the tissues. This treatment is repeated every other day until healing is complete, usually ten to 14 days.

RESULTS AND DISCUSSION

If a rumen cannula is inserted through an opening in the abdominal wall which has been made by separating each layer of

muscle in the direction of its fibers instead of incising them, the muscles will contract tightly around the cannula without need of suturing, and the cannula will be held firmly in place.

Carefully incising the rumenal wall only to the length of the diameter of the cannula to be inserted will make the rumen opening fit tightly around the base of the cannula without suturing. This greatly decreases the time of the operation, causes less injury to the edges of the rumenal opening, and provides for a more rapid and complete healing of the rumen to the inner surface of the abdominal wall.

SUMMARY

A plastic rumen fistula apparatus can be inserted into sheep in one operation. Such fistulas facilitate the force feeding of large quantities of unpalatable substances in exact daily doses. Large quantities of any substance may be fed quickly. Plant material can be ground, mixed with water to a creamlike consistency, and introduced deeply into the rumen through a funnel.

References

[1]Cook, C. Wayne, Thorne, J. L., Blake, J. T., and Edlefsen, James: Use of an Esophageal-Fistula Cannula for Collecting Forage Samples by Grazing Sheep. J. Anim. Sci., *17*, (1958): 189-193.

[2]Dougherty, R. W.: Permanent Stomach and Intestinal Fistulas in Ruminants: Some Modifications and Simplifications. Cornell Vet., *45*, (1955): 331-357.

[3]Farquharson, J.: Paravertebral Lumbar Anesthesia in the Bovine Species. J.A.V.M.A., *97*, (July, 1940): 54-57.

[4]Jarrett, J. G.: The Production of Rumen and Abomasal Fistulas in Sheep. J. Council for Sci. and Indust. Res., *21*, (1948): 311-315.

[5]Schalk, A. F., and Amadon, R. S.: Physiology of the Ruminant Stomach (Bovine). North Dakota Agric. Exper. Sta. Bull. 216, (1928): 15-20.

Observations on Estrus in Cows

The mean duration for 1,460 estrous periods of 270 dairy cows and heifers, at Louisiana State University, was 11.9 hours. Heifers had significantly longer estrous periods than parous cows. Estrus during pregnancy occurred in 14.4 per cent of the animals.

Ovulation occurred at an average of 12.4 hours after the end of estrus; therefore, the optimum time for insemination was seven to 12 hours after the onset of estrus. Clinical anestrus (undetected estrus) occurred in 33.4 per cent of the animals and represented 10.6 per cent of expected estrous periods. Had observations been made only at 6:00 a.m. and 6:00 p.m., instead of three times daily, many estrous periods would have been missed.—*J. Dai. Sci. (June, 1959): 1086.*

Polyvinyl Aids Prolapse Correction

To eliminate recurrence of rectal prolapse, polyvinyl alcohol sponge has been utilized both in dogs and man. This substance becomes incorporated into the tissues in which it excites a vigorous fibrotic response, with production of a firm, semicartilaginous mass. The product is available as Ivalon in Britain.

The prolapse-correcting operation utilizing this material is performed through a laparotomy incision. Then the peritoneum on either side of the mesorectum is reflected laterally as a flap, and the rectum with its rectal vessels is lifted out of the hollow of the sacrum. By careful dissection, the rectum is separated from the genital tract.

A sheet of polyvinyl alcohol sponge is attached to the ventral surface of the sacrum by three midline sutures. The polyvinyl sponge sheet is folded around the rectum in such a way as to make a tunnel that is complete in all except about one-fourth its circumference. It is attached to the rectum by sutures along its ventral free edges. The flaps of peritoneum are replaced to cover the operative field.—*Proc. Royal Soc. Med., (Aug., 1959): 602.*

Repair of Prolapsed Rectums in Mice

When 6 adult female Albino mice developed prolapsed rectums spontaneously, they were subjected to ether-alcohol inhalation anesthesia, held in a nose-down vertical position, and the rectums replaced. The anal opening was narrowed to 3/32 inch by first inserting a 3/32 inch probe into the rectum, then placing a purse-string suture periannally, using a 6-0 twisted silk eye suture with swaged-on atraumatic needle.

One mouse died during the night; the other 5 were alive one month later. The sutures had not been removed and prolapse had not returned.—*W. C. Dolowy, D.V.M., M.S., University of Illinois, Chicago.*

Reproductive Capacity of Farm Animals in Relation to Climate and Nutrition

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ENVIRONMENT COMPRISES the aggregate of all external conditions and influences affecting an animal. These conditions are the climate, topography, agro-ecologic conditions, animal management, plane of nutrition, disease, agricultural policies, and culture. The climate is a complex factor made up of a number of variables; namely, temperature, light, relative humidity, rainfall, and cosmic rays. These components affect soil physics and chemistry, yields and composition of crops and pastures, and virtually every function of the animal. Climatically, the world is divided into zones—frigid, temperate, and torrid.

The discussion to follow deals with fertility and related phenomena as affected by thermal, daylight, nutritional, and exteroceptive environment.

CLIMATIC ENVIRONMENT

The effect of climate on fertility, in one particular locality, varies with the species and the breed. In India, seasonal variation in semen quality was most marked in rams, followed in order by goats, bulls, and buffalo bulls.[10] In Brazil, Corriedale rams showed more seasonal variation in sex drive than the Australian Merino.[70] In Japan, most semen characteristics of asses did not vary seasonally.[71] This may be due to the fact that well-adapted species and breeds are less sensitive to climatic changes than less-adapted ones.

Sex drive of the male, which is independent of sperm production, is generally less in the summer months than in other seasons. Season and year differences in reaction time have been reported for rams, goats,[87] and buffalo bulls.[59] Most authorities agree that in bulls, sperm production and semen qualities are highest in the spring and lowest during late summer, fall, or winter.[27,62,69,76] Other investigators[76,89] have not detected any seasonal variation in most semen characteristics. Animals used in different studies of the effect of season on semen quality differed in age, breed, nutrition level, and size of sample. It is, therefore, impossible to assess how much of the difference in the results obtained was due to climate and how much to other factors. In horses and asses, climate influenced the physical characteristics of semen.[61]

The season affects the survivability and the freezability of semen. Sheep semen collected in the winter had higher and longer lasting motility *in vitro* than that collected in spring when rams are less sexually active. In dairy bulls, the useful viability was lower in winter than in spring and summer.[59]

The season of birth affects the age at first estrus. Gilts born late in the spring reached puberty at a younger age than those born early[82]; year to year differences in the age and live weight at puberty are marked.[93] In cattle, the age at first calving is not correlated with the season of birth. Climate seems to have a pronounced effect on the age of puberty only in the seasonal breeders. However, there is a striking difference in the age of puberty of beef heifers born in different years, the influence of rainfall on puberty being insignificant.[80]

In cattle, maximum conception rate, by natural breeding, occurs in the winter and spring. The minimum takes place in the summer and fall in both the northern[3,12,29,43,58] and southern hemispheres (Brazil). Data on artificial insemination in India[79] and Canada[16] do not reveal any seasonal differences in the conception rate. This is due to the use of uniformly good quality semen in all services. This, to a great extent, is bound to mask the seasonal influence which will be apparent in natural breeding. Moreover, in artificial insemination, we do not take into consideration cows which fail to come in heat during the different months of the year. The influence of season on conception rate has also been demonstrated in mares,[9,41,55,57,81] buffalo cows,[6] and goats.[52]

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The interval to postpartum estrus and conception in catttle is affected by the season.[77,91] This may be an indirect effect through the effect of climate on the lactating capacity. The effect of season on length of gestation is pronounced only in the mare[49,50] and the sow.

THERMAL ENVIRONMENT

"Summer sterility" in the ram is common; it seems to occur at latitudes of 35 degrees or more, but not at lower latitudes, such as Brazil[70] and Egypt.[38] It is possible that in these localities, hot summer days are associated with cold nights. Continuous heat is more detrimental to fertility than intermittent high and low temperatures. In the subtropics, there are seasonal variations in semen characteristics with two peaks at the spring and autumnal equinoxes.[38] Scrotal insulation experiments have shown that damage to spermatozoa occurs either during spermatogenesis or sperm migration rather than in the cauda epididymis.[34] The Romney Marsh breed, which has abundant wool on the scrotum, is more resistant to thermal stress than the Suffolk whose scrotum is devoid of wool. Shearing the rams is more effective in preventing the rise in testis temperature at low humidity than at high humidity.[32] Air-conditioning in the summer improves semen motility but not concentration and sex drive.[24] The latent period varies with the severity of ambient temperature and the fall in temperature during the night.[25]

Lowered fertility of European cattle in the tropics probably is due to thermal stress that increases body temperature and inhibits the anterior pituitary gland in the young animal. The duration of estrus is shortened when the monthly average temperature is over 16 C. (60.8 F.).[85] Romney Marsh ewes exposed to 105 F. for two months prior to the breeding season experienced estrus at the normal time but did not lamb.[93] Transplantation experiments with rabbits in a psychometric chamber have demonstrated that the damaging effect of high environment temperature is apparent on the uterine physiology rather than on the fertilized ovum.

DAYLIGHT ENVIRONMENT

Different species of mammals have been classified into three major classes according to the photoperiodic requirement of the sexual season.[37] Sheep and goats show estrus during the season of short days while asses, horses, and llamas show estrus during the season of long days. Species which show estrus the year round include the other highly domesticated animals such as cattle, buffalos, swine, rabbits, and those which originate in the tropics (little seasonal fluctuation in climate) such as camels.

The most severe climatic conditions coincide with a constant time of the year (winter months). The gestation length, which varies tremendously between the species, is a characteristic feature. In view of the previous facts, it appears that the factors which affect the survival of young are constant; namely, the season of severe climatic conditions and the length of pregnancy. The only unconditioned function of the animal is the season of mating. In the course of evolution, the different species have acquired an inherited rhythmicity so as to breed at a particular time of the year. This was linked with the most constant (year after year) exteroceptive factor, the day-length. It appears that the photoperiodic requirements of reproduction are correlated with the gestation length of the species.

It has been mentioned that the shortest days of the year coincide with the severe climatic conditions (winter months). In short-day breeders, mating is allowed during the shortest days. The gestation period in these species is one half-year cycle, like in sheep (150 days). Consequently, the time of birth coincides with the most favorable conditions for the survival of young (fig. 1A). In long-day breeders, however, mating only occurs during the longest days. The gestation period is two half-year cycles as with the horse and donkey. Consequently, the young are born during the longest days the next year (fig. 1B). On the other hand, in species which have been highly domesticated, such as farm animals (fig. 1C, D), the animals no longer have acquired any photoperiodic response, because the conditions (feed, housing, and disease control) for the survival of young are usually favorable. Matings and parturitions occur throughout the year irrespective of the gestation length or the day length.

In sheep, multiple births occur less frequently in seasons when the hours of sunlight are greater.[88] On the other hand, lack of sunlight for successive generation does not affect fertility in cattle.[68]

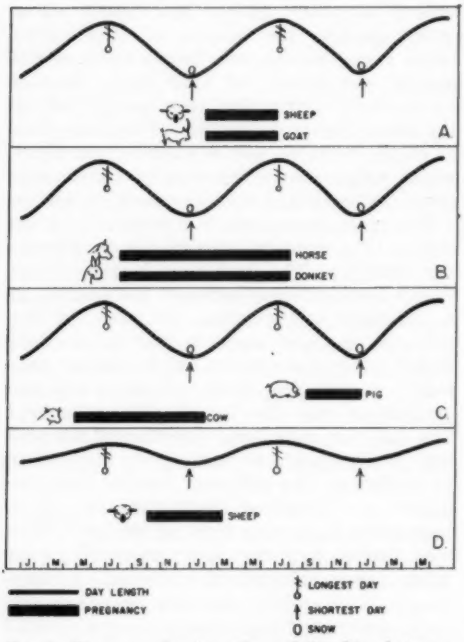

Fig. 1—Diagram showing the relationship between sexual photoperiodicity and gestation.

MODE OF ACTION

The effect of environment on reproduction may be exerted via the gonads, accessory sex organs, or the endocrine system. Seasonal variations have been reported in the weight of the gonads, accessory sex glands, endocrines, hormone output[8,56] and the histochemistry of testis and sperm.[94] Seasonal reproduction may be regulated by one or more of the following mechanisms: (*a*) the sensitivity of the gonads to the circulating gonadotropins;[67] (*b*) the output of gonadotropins;[36,83] and (*c*) the balance between the follicle stimulating hormone and the lutenizing hormone.[54]

Thyroid activity may be involved because the thyroxine secretion rate is affected by season.[64]

Artificial light has been used to control the breeding season of sheep[36,45,95] and mares,[72] to hasten the onset of estrus in mares,[17] and to advance or prolong the egg production season.[11] The effect of day length on male fertility seems to be more pronounced in birds than in mammals. However, in stallions, long-day treatment accelerates the function of the accessory sex glands by two months;[73] in rams, short-day treatment improves semen quality.[7]

The conventional view of photoreception is that light received by the eye sets off an unknown sequence of events terminating in the stimulation of adenohypophysis. One link in the chain of events between light stimulus and gonadal reaction may be the hypophysial portal vessels along with the central nervous system. Perhaps these regulate the activity of the adenohypophysis by means of a humoral relay through these vessels.[44] The effect of day length on fertility is a delayed reaction, the effect remains for some time after the stimulus ceases.[35,36]

Where high environmental temperatures are common during a portion of the year, breeding efficiency declines during the hot season. High temperature has no effect on estrus, yet it is inimical to satisfactory gestation in sheep.[95] It is possible that there is a minimum temperature for the satisfactory reproduction of each species and that this thermal reaction is related to the geographic origin of the species.

In dairy bulls, experimental increase of temperature causes decreased semen motility and concentration; a reduction in temperature resulted in increased ejaculum volume.[19]

At present, it seems difficult to separate the effects of day length and temperature. Controlled studies on reproductive physiology in psychometric rooms are needed.

NUTRITIONAL ENVIRONMENT

As a result of high caloric intake, puberty was hastened,[53] the number of services per conception in cattle was reduced,[15] but embryonic mortality in swine[86] and sheep[26] was increased. In swine, heavy feeding for ten successive generations[39] caused an increase in puberty weight, number of ovulations, embryonic mortality, and decreased the volume of allantoic fluid; yet other reproductive values at 38 days' pregnancy were constant. The effect of long-term controlled nutrition on reproductive phenomena in swine is shown (fig. 2).

The ovulation rate was higher in swine fed alfalfa than in those fed a legume-free diet.[90] Feeding 100 per cent concentrates causes a decrease in the ova volume and an increase in the number of zygotes with irregular configuration of blastomeres.[69] Early embryonic mortality can be attributed to limited quantities of a specific nutri-

tional substance. In sheep, twins seem to compete for this growth factor, and the male is more favored than the female in twins of mixed sex.[22] Further studies are needed to find and identify this substance in the endometrium.

So far as embryo weight is concerned, neither the level of feeding nor twinning has a significant effect on embryo weight at 40 days. Both, however, affect the chorion weight. The chorion weighs less where 2 embryos are present than when 1 is present. It weighs less in ewes that have been fed roughage than in those fed roughage plus grain. The effects of prenatal environment on embryonic mortality and development have been reviewed.[20]

Heifers on low phosphorus intake show varying signs of estrus during diestrus and clear-cut signs of estrus when the intake of phosphorus is optimal. This phenomenon is important when artificial insemination is used, because cows may be inseminated at the wrong time, with consequent poor results or even the setting up of pyometra. Severe manganese deficiency in swine is not likely to occur under natural conditions unless caused by interference of some other dietary substance.[78]

Vitamin D affects female fertility.[1,47] The maintenance of a satisfactory vitamin D status minimized the influence of calcium and phosphorus intake on fertility. Unfortunately, maintenance of a satisfactory vitamin D status can be difficult when consumption of carotene is high.[46] Low carotene diet for two generations increases the frequency of stillbirth and causes pituitary cysts.[18] The administration of alpha-tocopherol acetate for five weeks after calving does not affect the intensity of estrus, the interval between calving, or fertility.[31]

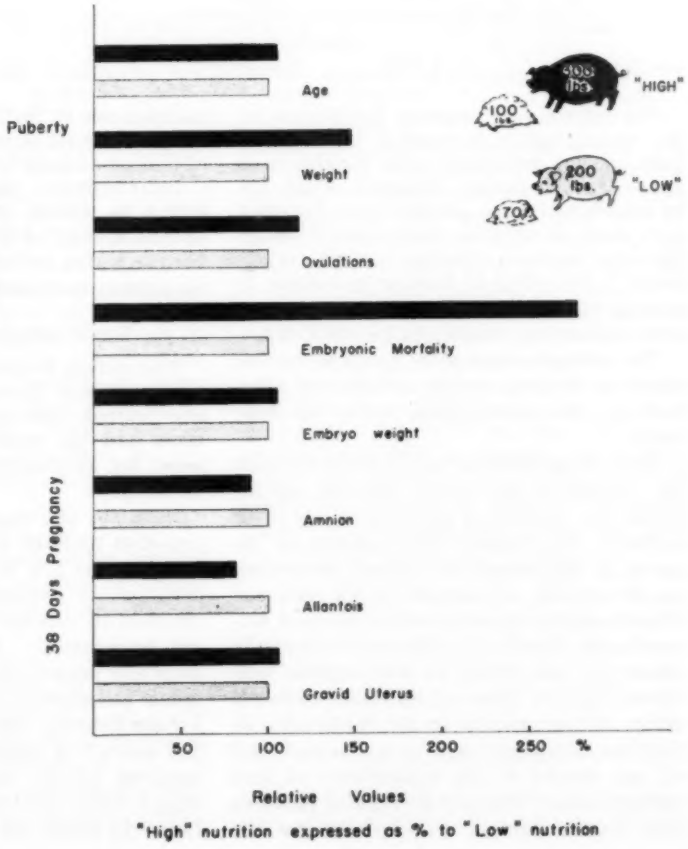

Fig. 2—The effect of controlled nutritional environments for ten successive generations on reproductive performance of F_{10} gilts killed 38 days postcoitum. Calorie intake of "low" plane gilts was 70 per cent of that of the "high" plane ones.

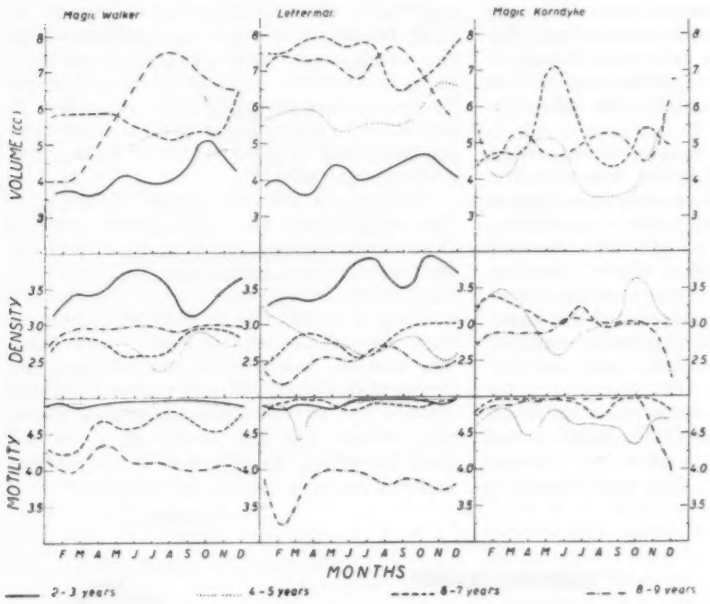

Fig. 3—Individual variations and seasonality in semen production as affected by age. Bull "Letterman" showed marked age differences in semen characteristics. Bull "Magic Korndyke" showed marked seasonal variations.

The influence of mineral imbalances on the susceptibility to genital infection is well known. Infection with Trichomonas and *Coryenbacterium pyogenes* could not be established when animals were provided with more phosphorus than calcium. When this was reversed, infection could be established.[46] The effect of feeding in relation to genital vibriosis is not known, but a possible connection should not be ruled out.

The estrogen content of pastures has no effect on fertility except in extreme cases such as the subterranean clover in Australia.

Though succulent or green feeds increase the volume of the semen, they do not increase the number of spermatozoa or their viability. The number and viability of the sperm in bull semen is in direct proportion to the amount of protein in the ration.[42] Protein deficiency, over-consumption of water,[63] and vitamin A deficiency[28] adversely affect the sex drive. In monozygotic bull calves, the low plane of nutrition causes a delay of four months in the appearance of fructose and citric acid in the semen, and of one month in the appearance of first spermatozoa.[66] There is no reliable evidence that animal protein is necessary for the maintenance of fertility in the bull, or that ruminant fertility is influenced by the type of dietary carbohydrate or fat.

Luteohormone and deoxycorticosterone added to diluted semen prolong survival time of sperm.[21] Further studies are needed for the better understanding of nutritional requirements of sperm *in vitro*.

EXEROCEPTIVE ENVIRONMENT

This refers to certain stimuli impinging on the animal through touch, smell, sight, and hearing. The constancy of the environment and the approximation of the two sexes act as conditioned reflexes to sexual behavior.

In cattle, the vagina contracts when approached by bulls or other cows in estrus, or when the cow is placed in a stand preparatory to artificial insemination. Such conditioned reflexes are retained throughout pregnancy.[75] Anestrus cows do not show any sexual reflexes on preparation for semen collection. Mating dairy heifers with a vasectomized bull hastens ovulation by two hours.[65] A neurohumoral mechanism is involved in the release of luteohormone (L.H.) from the hypophysis and in ovulation.[43] In sheep, the effect of approximation

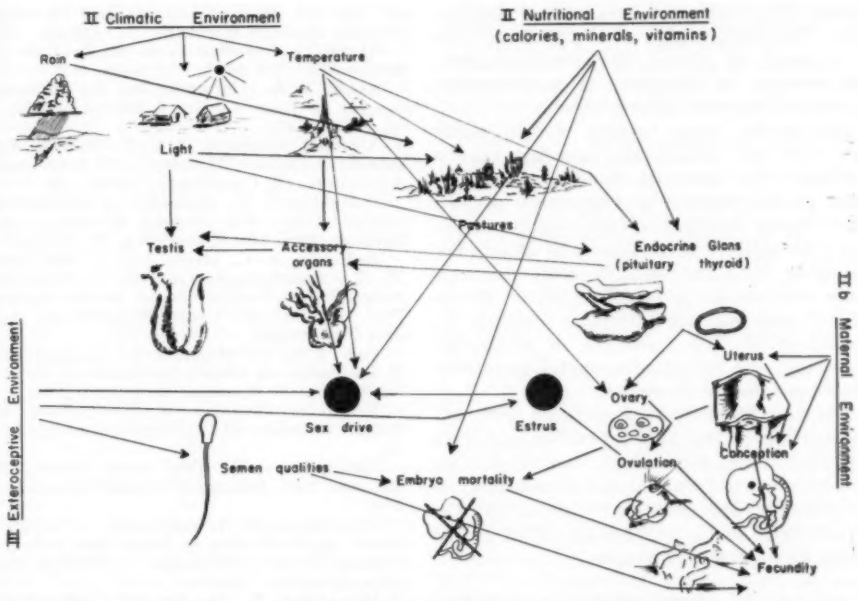

Fig. 4—Diagram illustration of relationship between different components of environment and female fertility, male fertility, and embryonic mortality.

of the male on female fertility has been reported. This effect is more marked in certain breeds or certain localities than in others. When mares are mated one to two days after foaling, and in the absence of the foal, the external manifestation of estrus is greatly inhibited.[75] In the rabbit, the effect of sexual reflexes on ovulation is so marked psychologically as to become its determining cause. Crowded barns, chaining, hard flooring with insufficient straw, pain, and stress during transportation, all inhibit estrus reflexes. More attention should be paid to reflex-promoting and -inhibiting factors in planned breeding.

DIFFERENTIAL RESPONSES

The effect of environment on the fertility level of farm animals is modified by several factors; namely, the locality, sex, age, and husbandry methods.

In breeds of sheep which originated at high latitudes or altitudes, the breeding season is more associated with the daylight environment than in those which originated near the equator or low altitudes.[36]

Seasonal variation in the Swedish Red and White breed is more pronounced than in Lowland cows.[51] It is possible that less domesticated breeds still retain the natural tendency of their ancestors to mate more frequently in late summer and fall. In Australia (subtropical zone), there is but slight seasonal difference in the litter size in pigs.[5] Calvings are more uniformly distributed for older cows than for younger ones.[74] The percentage of calves born in the fall decreases with increasing herd size.[77]

In the male, maximum and minimum levels of semen qualities are not attained in the same season of the year. In sheep, motility is lowest in summer and highest in fall, but concentration is lowest in fall and highest in winter.[76] Moreover, seasonal fluctuations for any semen character are not identical for different species, even at the same latitude. Young bulls show no seasonal trends in semen qualities.[89] There are also marked individual differences in the semen production as affected by seasonal changes (fig. 3). The mechanisms by which the environment affects fertility are shown (fig. 4).

ADAPTIVE STERILITY

Adaptive sterility is common in farm animals. The physiologist and the animal

breeder have different concepts of adaptability. The suppression of sexual functions as a result of stress (e.g., malnutrition, overexertion, or disease) is a protective adaptation against further stress.

Abnormally long estrous cycles occur very early and late in the breeding season of sheep.[92] In Australia, floods, followed by warm humid weather and mosquito plague, cause flabby testes and seminal degeneration.[23] In cattle, the environment affects the incidence of silent heat,[30] short estrus,[13] cystic ovaries, and infantile ovaries.[4] Mares exhibit seasonal variations in estrous irregularity.[2,81] The incidence of stillbirths in swine[33] and embryonic mortality in rabbits[14] are affected by season.

Adaptive sterility is associated with hyperfunction of the adrenal cortex and with hormonal imbalance. Such hormonal factors have been discussed in relation to cystic follicular degeneration.[84] Moreover, the environment has a well-known effect on the incidence of genital diseases.

SUMMARY

The effect of climate on fertility varies with the species, breed, and age as a result of different degrees of adaptability. "Summer sterility" in rams occurs at latitudes of 35 degrees or more. Season affects survivability and freezability of semen. Climate affects puberty, conception rate (by natural breeding), and the interval to postpartum estrus.

Thermal stress affects spermatogenesis, sperm migration, and the pituitary and endometrial function. Air-conditioning improves motility, not concentration.

Mammals are classified according to sexual photoperiodicity. Climatic mechanisms effect fertility.

The effects of heavy feeding on fertility and embryonic mortality vary with the species. Minerals, vitamins, and deficiencies are factors involved.

Reflex-promoting and -inhibiting factors affect sex behavior.

The suppression of sexual functions owing to stress is a protective adaptation syndrome.

References

[1]Abrams, J. T.: Livestock and Their Environments IV. The Relationship of Sunlight to Bovine Reproductive Efficiency and Productivity. Brit. Vet. J., *108*, (1952): 25.

[2]Aehnelt, E., and Plas, J.: Influence of the Time of Year on Heat, Ovulation and Fertilization. Deutche Tierärztl Wchnschr., *53*, (1946): 84.

[3]Akucs, L.: Contribution on the Sex Life of the Bovine. Jber. Vet. Med., *70*, (1943): 523.

[4]Asdell, S. A.: Hormones and the Treatment of Sterility in Dairy Cattle: A Review. J. Dai. Sci., *32*, (1949): 45.

[5]Australia—Canberra, A. C. T.: Bureau of Agricultural Economics, Department of Commerce and Agriculture. Pig Crop Report (1954): 16.

[6]Badreldin, A. L.: Frequency of Successful Conception Under Free Mating Conditions in the Egyptian Buffaloes. Experientia, *8*, (1952): 391.

[7]Badreldin, A. L., Hafez, E. S. E., and Darwish, M. Y.: Spermatogenic Activity in Sheep Under Natural and Artificial Light in the Subtropics. Proc. 1st Internat. Cong. Photobiology, Amsterdam (1954): 104.

[8]Beer, J. R., and Meyer, R. K.: Seasonal Changes in the Endocrine Organs and Behavior Patterns of the Muskrat. J. Mammal., *32*, (1951): 173.

[9]Berge, S.: Fertility of the Ostland Horse. Tidsskr. Landbr., *11/12*, (1944), and ½, (1945): 34.

[10]Bhattacharya, P., Div. Anim. Genet., Indian Vet. Res. Inst., Izstnagar.: Personal communication, 1957.

[11]Bissonnette, T. H., and Csech, A. G.: Light induced Egg-Production in Large Pens Followed by Normal Nesting in Pheasants. J. Wildlife Management, *5*, (1941): 383.

[12]Bonadonna, T.: The Seasonal Cycle and Animal Fertility. Zootech.e Vet., *6*, (1951): 588.

[13]Bonfert, A., and Ftromm, S.: Occurrence and Manner of Short Oestrus Intervals. Deutsche Tierärztl Wchnschr., *60*, 1953.

[14]Brambell, F. W. R., and Mills, I. H.: Studies on Sterility and Gerenatal Mortality in Wild Rabbits. IV. The Loss of Embryos After Implantation. J. Exptl. Biol., *25*, (1948): 241.

[15]Brannang, E.: Some Causes of Disturbances in the Fertility of Cattle. Svensk JordbrForsk. (1954): 195.

[16]Burgess, T. D.: The Effect of Month and Season upon Breeding Efficiency Obtained with Artificial Insemination Under Ontario Conditions. Canad. J. Agric. Sci., *33*, (1953): 396.

[17]Burkhardt, J.: Transition from Anoestrus in the Mare and Effects of Artificial Lighting. J. Agric. Sci., *37*, (1947): 64.

[18]Byers, J. H., Jones, I. R., and Bone, J. F.: Carotene in the Ration of Dairy Cattle. II. The Influence of Suboptimal Levels of Carotene Intake upon the Microscopic Aspect of Selected Organs. J. Dai. Sci., *39*, (1956): 1556.

[19]Casady, R. B., Myers, R. M., and Legates, J. E.: The Effect of Exposure to High Ambient Temperature on Spermatogenesis in the Dairy Bull. J. Dai. Sci., *36*, (1953): 14.

[20]Casida, L. E.: Variations in the Maternal Environment Affecting Prenatal Survival and Development. Proc. (3rd) Internat. Cong. Anim. Reprod. (Cambridge) Plenary Sec. (1956): 19.

[21]Curto, G. M.: Vitamins, Hormones et Vitalite des Spermatozoides. Proc. Third Internat. Cong. Anim. Reprod. (Cambridge) Plenary Sec., (1956): 121.

[22]Donald, H. P., and Purser, A. F.: Competition *in Utero* Between Twin Lambs. J. Agric. Sci., *48*, (1956): 245.

[23]Dun, R. B.: Temporary Infertility of Rams As-

sociated with Flooding. Austral. Vet. J., *32*, (1956): 1.

[24]Dutt, R. H., and Bush, L. F.: The Effect of Low Environmental Temperature on Initiation of the Breeding Season and Fertility in Sheep. J. Anim. Sci., *14*, (1955): 885.

[25]Dutt, R. H., and Hamm, P. T.: Effect of Exposure to High Environmental Temperature and Shearing on Semen Production of Rams in Winter. J. Anim. Sci., *16*, (1957): 328.

[26]El-Sheikh, A. S., Hulet, C. V., Pope, A. L., and Casida, L. E.: The Effect of Level of Feeding on the Reproductive Capacity of the Ewe. J. Anim. Sci., *14*, (1955): 919.

[27]Erb, R. E., Andrews, F. N., and Hilton, J. H.: Seasonal Variation in Semen Quality of the Dairy Bull. J. Dai. Sci., *25*, (1942): 815.

[28]Erb, R. E., Andrews, F. N., Hauge, S. M., and King, W. A.: Observations on Vitamin A Deficiency in Young Dairy Bulls. J. Dai. Sci., *30*, (1947): 687.

[29]Erb, R. E., and Waldo, D. R.: Seasonal Changes in Fertility of Dairy Bulls in Northwestern Washington. J. Dai. Sci., *35*, (1952): 245.

[30]Feoktistov, L. I.: Sterility of Cows in the Kurgan State Stud Farm. Shorn Rab. celjabinsk, sel. hoz. opypt. Stanc., *1*, (1939): 67.

[31]Fogdegaard, G.: A Study of the Effect of Parenteral Supplements of Vitamin E on the Sexual Functions of Cows with Weak Heat. Proc. Third Internat. Cong. Anim. Reprod. (Cambridge) Sec. 2, (1956): 62.

[32]Foote, W. C., Pope, A. L., Nichols, R. E., and Casida, L. E.: The Effect of Variations in Ambient Temperature and Humidity on Rectal and Testis Temperatures of Sheared and Unsheared Rams. J. Anim. Sci., *16*, (1957): 144.

[33]Georgiev, I., and Totev, S. D.: Stillborn piglings. Izv. Inst. Zivotn. (Sofija), ½, (1951): 177.

[34]Glover, T. D.: The Effect of a Short Period of Scrotal Insulation on the Semen of the Ram. J. Physiol., *128*, (1955): 22.

[35]Hafez, E. S. E.: Reproduction in Sheep and the Response to Artificial Light. Experientia, *7*, (1951): 423.

[36]Hafez, E. S. E.: Studies on the Breeding Season and Reproduction of the Ewe. I. The Breeding Season in Different Environments. II. The Breeding Season in One Locality. III. The Breeding Season and Artificial Light. IV. Studies on the Reproduction of the Ewe. V. Mating Behavior and Pregnancy Diagnosis. J. Agric. Sci., *42*, (1952): 225.

[37]Hafez, E. S. E.: Puberty in Sheep and Daylight Stimuli. Proc. First Internat. Cong. Photobiology, (Amsterdam), (1954): 104.

[38]Hafez, E .S. E., Badreldin, A. L., and Dawish, Y. M.: Seasonal Variations in Semen Characteristics of Sheep in the Suptropics. J. Agric. Sci., *45*, (1955): 283.

[39]Hafez, E. S. E.: Nutrition in Relation to Reproduction in Sows. J. Agric. Sci., (1960): In press.

[40]Hafez, E. S. E., and Bonadonna, T.: Strain Differences and Seasonality of Semen Production in Bulls. Southwest. Vet., *12*, (1959): 11.

[41]Halasz, B.: Contributions to the Question of Autumn and Spring Foaling with Special Regard to Large-Scale Horse Breeding. Acta Agron. (Budapest), *4*, (1954): 151.

[42]Hammond, J.: Physiology of Reproduction in Relation to Nutrition. Brit. J. Nutr., *3*, (1949): 79.

[43]Hansel, W.: Notes from the Cornell Nutrition Conference for Feed Manufacturers, Nov. 6, 7, 1952. J.A.V.M.A., *122*, (Feb. 1953): 126.

[44]Harris, G. W.: Proceedings of the Society for Endocrinology. Symposium on the Anterior Pituitary-Gonadal Relationship. J. Endocrinol., *5*, (1947): 17.

[45]Hart, D. S.: Photoperiodicity in Suffolk Sheep. J. Agric. Sci., *40*, (1950): 143.

[46]Hignett, S. L.: The Influence of Calcium, Phosphorus, Manganese and Vitamin D on Heifer Fertility. Proc. Third Internat. Cong. Anim. Reprod. (Cambridge) Sec. 1 (1956): 116.

[47]Hignett, S. L., and Hignett, P. G.: The Influence of Nutrition on Reproductive Efficiency in Cattle. III. The Influence of Vitamin D Status on the Effect of Calcium and Phosphorus Intake on the Fertility of Cows and Heifers. Vet. Rec., *65*, (1953): 21.

[48]Hilder, R. A., Fohrman, M. H., and Graves, R. R.: Relation of Various Factors to the Breeding Efficiency of Dairy Animals and to the Sex Ratio of the Offspring. J. Dai. Sci., *27*, (1944): 981.

[49]Howell, C. E., and Rollins, W. C.: Environmental Sources of Variation in the Gestation Length of the Horse. J. Anim. Sci., *10*, (1951): 789.

[50]Illancic, D., and Zavrnek, F. I.: The Gestation Period and Birth Weight of Arab Foals in Yugoslavia. Veterinaria (Sarajavo), *1*, (1952): 274.

[51]Johansson, I.: The Effect of Time of Calving in the Fertility and Milk Yield of Cows and on the Utilization of Pasture. Svenska Vallo-o. Mosskulturfor. Kvartaisskr., *4*, (1942): 328.

[52]Jordao, L. P., and Filho, C. F. C.: The Reproductive Efficiency of Goats in Sao Paulo. Bol. Industr. Anim. N. S., *13*, (1952): 79.

[53]Joubert, D. M.: The Influence of Winter Nutritional Depressions on the Growth, Reproduction and Production of Cattle. J. Agric. Sci., *44*, (1954): 5.

[54]Kammlade, W. G., Jr., Welch, J. A., Nalbandov, A. V., and Morton, H. W.: Pituitary Activity of Sheep in Relation to the Breeding Season. J. Anim. Sci., *11*, (1952): 646.

[55]Kern: The Most Favourable Time for Mating Mares. Tierzüchter, *1*, (1949): 129.

[56]Kirst, E. A.: Seasonal Activity of the Endocrine System. Priroda (Mosk.), *12*, (1948): 53.

[57]Koroljkov, A. G.: Reproduction Indices in Relation to Dates of Foaling of Mares under Taboon Conditions. Konevodstvo, *22*, (1952): 30.

[58]Kumaran, J. D. S.: The Percentage of Conception in the Artificial and Natural Breeding. Indian Vet. J., *21*, (1944): 137.

[59]Kushwaha, N. S., Mukherje, D. P., and Bhattacharya, P.: Seasonal Variations in Reaction Time and Semen Qualities of Buffalo-bulls. Indian J. Vet. Sci., *25*, (1955): 317.

[60]Kvasnitsky, A.: Generative Functions of Ovary and Productivity of Farm Animals. Proc. Third Internat. Cong. Anim. Reprod. (Cambridge), Plenary Sec., (1956): 59.

[61]Laplaud, M., Brunell, R., and Galland, H.: Periodicity of the Viscous Secretion of Horse and Ass Semen. Compt. rendu Acad. Sci., (Paris) *230*, (1956): 2049.

[62]Lewis, R. C.: Effect of Season upon Spermatogenesis and Fertility of Dairy Bulls under Michigan Conditions. J. Anim. Sci., *7*, (1948): 514.

[63]Liebenberg, O.: The Influence of Various Environmental Factors on the Fertilizing Capacity

of Male Animals, with Special Reference to the Semen Picture. Neuman, Radebeul and Berlin, Germany, 1953.

[64]Maqsood, M.: Some Aspects of Thyroid Physiology in the Male. I. Thyroxin Secretion Rate—Effects in the Male Rabbit of Age, Season and Castration. II. Influence of the Thyroid on Body Growth in the Male. Zootechnia, *2,* (1953): 258.

[65]Marion, G. B., Smith, V. R., Wiley, T. E., and Barrett, G. R.: The Effect of Sterile Copulation on Time of Ovulation in Dairy Heifers. J. Dai. Sci., *33,* (1950): 885.

[66]Mann, T., and Rowson, L. E. A.: Effect of Different Planes of Nutrition on the Composition of Bull Semen. Proc. Third Internat. Cong. Anim. Reprod. (Cambridge), Sec. 1, (1956): 21.

[67]McCormack, G., and Elden, C. A.: Seasonal Variation of Rabbits to Pituitary Extracts. Endocrinology, *37,* (1945): 297.

[68]McDiarmid, A., Coid, C. R., and Elliot, J.: Some Aspects of the Reproductive History of 473 Cattle Maintained Indoors in an Isolation Compound for a Period of Seven Years. Proc. Third Internat. Cong. Anim. Reprod. (Cambridge), Sec. 2, (1956): 41.

[69]Mercier, E., and Salisbury, G. W.: Seasonal Variations in Hours of Daylight Associated with Fertility Level of Cattle under Natural Breeding Conditions. J. Dai. Sci., *30,* (1947): 747.

[70]Mies Filho, A., and Ramos, A. A.: Semen Production of Rams in Brazil. Proc. Third Internat. Cong. Anim. Reprod. (Cambridge), Sec. 3, (1956): 101.

[71]Nishikawa, Y., Waide, Y., and Onuma, H.: Studies on Reproduction in Asses. VII. Morphological Studies of Semen. Bull. Nat. Inst. Agric. Sci. (Chiba) Ser. G., No. 1, (1951): 47.

[72]Nishikawa, Y., Sugie, T., and Harada, N.: Studies on the Effect of Day Length on the Reproductive Function in Horses. I. Effect of Day Length on the Function of Ovary. Bull. Nat. Inst. Agric. Sci. (Chiba) Ser. G., No. 3, (1952): 35.

[73]Nishikawa, Y., and Horei, T.: Studies on the Effect of Day Length on the Reproductive Function in Horses. II. Effect of Day Length on the Function of Testes. Bull. Nat. Inst. Agric. Sci. (Chiba) Ser. G., No. 3, (1952): 45.

[74]Ostergaard, P. S.: The Calving Month of Cows. Nord. Jordbr Forskn No. 112, (1945): 84.

[75]Parshutin, G. V.: The Role of the Nervous System in the Reproduction of Farm Animals. Proc. Third Internat. Cong. Anim. Reprod. (Cambridge) Plenary Sec., (1956): 45.

[76]Phillips, R. W., Knapp, B., Jr., Heemstra, L. C., and Eaton, O. N.: Seasonal Variation in the Semen of Bulls. Am. J. Vet. Res., *4,* (April, 1943): 115.

[77]Phillips, R. W., Schott, R. G., and Simmons, V. L.: Seasonal Variations in the Occurrences of Conceptions in Karakul Sheep. J. Anim. Sci., *6,* (1947): 123.

[78]Plumlee, M. P., Thrasher, D. M., Beeson, W. M., Andrews, F. N., and Parker, H. E.: The Effects of a Manganese Deficiency upon the Growth, Development, and Reproduction of Swine. J. Anim. Sci., *15,* (1956): 352.

[79]Prabhu, S. S., and Bhattacharya, P.: Seasonal Variation in Conception Rates in Artificially Bred Cows. Indian J. Vet. Sci., *23,* (1953): 129.

[80]Quinlan, J., Roux, L. L., and Van Aswegen, W. G.: Researches into Sterility of Cows in South Africa. The Influence of: (I) Dry Rations and (11) Lack of Exercise on Sexual Maturity and the Duration of the Ovarian Cycle in Beef Heifers. Onderstepoort J. Vet. Sci., *12,* (1939): 233.

[81]Quinlan, J., Van Rensburg, S. W. J., and Steyn, H. P.: The Oestrus Cycle of the Mare when Maintained under Stabled Conditions with Restricted Exercise at Onderstepoort. Onderstepoort J. Vet. Sci., *25,* (1951): 105.

[82]Robertson, G. L., Casida, L. E., Grummer, R. H., and Chapman, A. B.: Some Feeding and Management Factors Affecting Age at Puberty and Related Phenomena in Chester White and Poland China Gilts. J. Anim. Sci., *10,* (1951): 841.

[83]Robinson, T. J.: The Control of Fertility in Sheep. I. Hormonal Therapy in the Induction of Pregnancy in the Anoestrus Ewe. J. Agric. Sci., *40,* (1950): 275.

[84]Schaetz, F.: Grundlagen der Zyklusgebundenen Sterilitat des Rindes mit Berucksichtigung der Sogenannten Nymphomanie. Proc. Third Internat. Cong. Anin. Reprod. (Cambridge), Sec. 2, (1956): 56.

[85]Schmidt, K., and Bretschneider, W.: The Outward Course of the Sexual Cycle in the Sow. Tierzüchter, *8,* (1954): 119.

[86]Self, H. L., Grummer, R. H., and Casida, L. E.: The Effects of Various Sequences of Full and Limited Feeding on the Reproductive Phenomena in Chester White and Poland China Gilts. J. Anim. Sci., *14,* (1955): 573.

[87]Shukla, D. D., and Bhattacharya, A. P.: Seasonal Variation in "Reaction-time" and Semen Quality of Goats. Indian J. Vet. Sci., *22,* (1953): 179.

[88]Singh, O. N., and Nelson, R. H.: Effect of Certain Environmental Factors on Reproductive Performance of Ewes and Growth of Lambs. Quart. Bull. Michigan Agric. Exper. Sta., *38,* (1955): 192.

[89]Swanson, E. W., and Herman, H. A.: Seasonal Variation in Semen Quality of Some Missouri Dairy Bulls. J. Dai. Sci., *27,* (1944): 303.

[90]Teague, H. S.: The Influence of Alfalfa on Ovulation Rate and Other Reproductive Phenomena in Gilts. J. Anim. Sci., *14,* (1955): 621.

[91]Warnick, A. C.: Factors Associated with the Interval from Parturition to First Estrus in Beef Cattle. J. Anim. Sci., *14,* (1955): 1003.

[92]Williams, S. M., Garrigus, U. S., Norton, H. W., and Nalbandov, A. V.: Variations in the Length of Estrus Cycles and the Breeding Season in Ewes. J. Anim. Sci., *15,* (1956): 984.

[93]Wilson, S. G.: The Seasonal Incidence of Calving and of Sexual Activity in Zebu Cattle in Nyasaland. J. Agric. Sci., *36,* (1946): 246.

[94]Wislocki, G. B.: Seasonal Changes in the Testes, Epididymides and Seminal Vesicles of Deer Investigated by Histochemical Methods. Endocrinology, *44,* (1949): 167.

[95]Yeates, N. T. N.: The Effect of High Air Temperature on Reproduction in the Ewe. J. Agric. Sci., *43,* (1953): 199.

Edema Disease of Swine. I. A Preliminary Report on Experimental Transmission

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EDEMA DISEASE of swine was first reported in Ireland in 1938[4] and has since been reported in Europe, Canada, Africa, and the United States. In many swine-producing areas of the world it is considered the most important disease of weaned pigs.

Several reviews[1-3] on edema disease have been published recently in which the authors have reported that the disease affects primarily pigs of the 6- to 16-week age group and occurs throughout the year. The morbidity ranges from 4 to 40 per cent, with mortalities as high as 90 per cent of the visibly affected animals. The duration of the disease is from two to 14 days. In many cases, the thriftier pigs are affected first, with death occurring before any visible signs of illness. The clinical signs of the disease are listlessness, weak incoordinated gait, paralysis, prostration and constipation or diarrhea. The temperature is generally not elevated, but in a few animals it may exceed 104 F. The pathologic changes reported from field cases are included in the discussion section of this paper.

Frequently, *beta* hemolytic strains of *Escherichia coli* have been isolated from pigs with edema disease. The clinical signs and lesions of the disease have frequently been reproduced by the intravenous injection of supernatant fluids from intestinal contents of diseased pigs and from cultures of *Esch. coli* or by the intravenous injection of a living culture of *Esch. coli*. It was postulated that edema disease was caused by the absorption of the endotoxins produced in the intestines by a rapidly multiplying *Esch. coli* while the pig was under severe stress brought about by weaning, change of feed, or feeding methods. Conceivably, the unnatural treatment of injecting a foreign substance directly into the blood stream could be the stress needed to free a latent agent which would in turn cause the edema disease.

This is a preliminary report on a transmissible agent which produces the clinical signs and pathologic changes associated with edema disease in swine.

PROCEDURES AND RESULTS

Natural Edema Disease.—The pigs used in transmission experiments for the study were obtained by hysterectomy[5,8] and raised in isolation.[6,9] In the study of the agent causing Nebraska University Disease (NUD), it was found that the most suitable method for isolation of the transmissible agent was exposure of a susceptible disease-free, colostrum-deprived pig to the animals in a diseased herd. In isolating this edema disease agent, 5 disease-free, crossbred boars, 3 months old, were exposed to 6 recently weaned pigs from a diseased herd. After several days of contact, 1 of the disease-free pigs became clinically ill, and 1 other pig died without any clinical signs. The remaining 3 disease-free pigs did not show any evidence of illness. On necropsy of the first pig to die, the only pathologic lesion noticed was a small area of consolidation of the lung. The second pig which showed clinical signs of the disease lived for three weeks and developed more complicated pathologic changes, possibly enhanced by secondary invaders. The 6 pigs from the diseased herd showed no signs of edema disease during this experimental period.

Experimental Edema Disease.—A blood specimen collected from the first naturally infected pig to die was diluted 1:10 in nutrient broth, and 5 ml. was administered by the intranasal-oral route to a 1-week-old pig during ether anesthesia. On the fifth day, the pig died without any clinical signs preceding death. This first passage was followed by nine more such serial passages in 1-week-old pigs using 2 ml. of 1:10 or higher dilution of blood or lung tissue. All the pigs inoculated in these transfers died

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between two and five days after inoculation.

Routine bacteriologic cultures were made of blood and tissues on tryptose phosphate broth, blood-agar plates and agar slants incubated at 37 C. Positive bacterial cultures were obtained from some of the tissues, but on reinoculation into susceptible pigs they did not produce the disease.

In one titration experiment, the blood from the fourth serial passage pig was infective when 2-ml. dilutions ranging from 50 to 100,000 were given intranasally-orally. All 9 pigs died on the second day after inoculation.

Temperatures were taken daily on 6 pigs from the time of inoculation until death. Three of these pigs showed no temperature increase, while 3 had temperatures of 105 to 107 F. on the day preceding death.

Neutralization tests were made *in vivo* with 20 ml. of commercial anti-hog cholera serum or anti-swine erysipelas serum and *in vitro* with laboratory-prepared anti-hog cholera and anti-NUD serums. In all tests, the serums failed to neutralize the agent and all pigs, including the control animals, died two or three days after inoculation.

In filtration experiments, the agent present in blood and lung tissue failed to pass through the 015, 02, 03 Selas or medium, dense, very dense Gradacol membrane filters. This was confirmed in six experiments involving 23 pigs. The filtrates were administered intranasally-orally with 2- to 5-ml. amounts and failed to elicite any signs of the disease, while all the control animals given the unfiltered material died in two to five days. Infective material heat-treated at 50 C. for 15 minutes was inactivated and failed to produce the disease when inoculated into pigs intranasally-orally.

Mice inoculated intraperitoneally, intranasally-orally, and subcutaneously with a dilution of blood infective for pigs, failed to show clinical signs of disease.

The infective agent from blood of the eighth serial pig passage was established in 7-day-old chicken embryos via the yolk sac. The sixth egg passage killed all embryos on the second day. When 2 ml. of this sixth egg passage material was inoculated intranasally-orally into a pig, the pig died on the third day with typical lesions of edema disease. Routine bacteriologic examinations of all eggs were negative when incubated under aerobic and anaerobic conditions.

When blood from an infected pig was inoculated into the axillary space of a susceptible disease-free pig, death resulted on the second day. A susceptible pig inoculated intranasally-orally with urine from a diseased pig failed to develop the disease.

Of 35 pigs inoculated intranasally-orally with the expected lethal dose, 31 died, 3 were moribund when destroyed, and the remaining 1 had a temperature of 107 F. when killed on the ninth day. Of the 31 pigs which died, 15 showed no clinical signs of illness prior to death, 8 had a mild diarrhea, 4 were anoretic, and 4 were moribund on the day preceding death. Deaths occurred from two to seven days (av. 3 days) following inoculation. The experimental disease produced many of the pathologic changes (fig. 1) reported from field cases of edema disease.

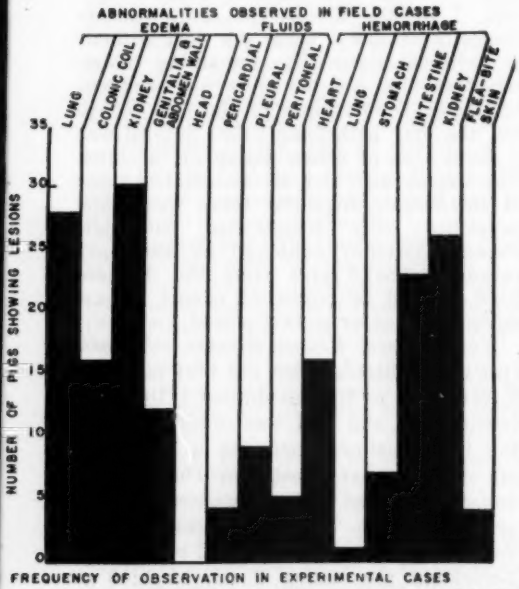

Fig. 1 — The frequency of the lesions observed in 35 animals experimentally infected with edema disease of swine.

DISCUSSION

The severe edema of the colonic coil, kidneys, perirenal tissues, and the genitalia; frequency of pleural and peritoneal fluids which gel on exposure to air;

petechial hemorrhages of the stomach, intestines, kidneys, and heart; unpredictable temperatures; occasional flea-bite skin lesion; and death without any clinical signs of illness; all indicate that the natural occurring edema disease and this experimentally transmitted disease are caused by the same or related agents.

The pathologic changes typical of edema disease are apparently produced by an infectious agent. If toxins are involved, the condition is produced by the infectious agent in the host, inasmuch as toxic substances failed to pass through the Selas or the Gradacol filters in sufficient quantities to produce the disease. These data appear to support the conclusion that the agent is a virus. The unfilterability does not rule out a viral agent, as it could easily bind itself to tissue fragments and be retained within the filter. Preliminary results show that supernatant fluids from materials centrifuged at 10,000 r.p.m. for ten minutes are highly infective for pigs. The viral theory is also supported by the multiplication in the yolk sacs of chicken embryos and the inactivation of the agent by a comparatively low temperature. The possibility that the edema disease agent is bacterial has not been completely eliminated. The organism could be of a fastidious nature, requiring growth factors or conditions not incorporated in routine culture methods.

Edema disease most frequently affects pigs in the 6- to 16-week age group during which time the colostral-antibody has been diluted or depleted, decreasing the protection of the animal. This indicates that an immunologic response occurs which protects older animals and younger pigs nursing immune dams.

A more detailed study is necessary to establish the characteristics of the etiologic agent. The prevalence and transmission during natural conditions, the immunologic responses, and the possible control with available drugs or management practices should all be investigated.

SUMMARY

An experimentally transmissible disease in pigs which produces the clinical signs, edema, and hemorrhage characteristic of edema disease of swine is herein reported.

The disease is transmitted by the intranasal-oral inoculation of diluted blood or lung tissues. Pigs die within two to seven days after inoculation. Ten serial passages have been made in disease-free pigs. Six serial yolk sac passages in embryonating chicken eggs have also been made. The agent is not neutralized by the antiserums of hog cholera, erysipelas, or Nebraska University Disease (NUD).

Evidence obtained thus far does not substantiate this as a toxic condition associated with *Escherichia coli*. A viral entity would appear to be a more likely cause.

References

[1]Bennett, P. C.: Edema Disease. In "Diseases of Swine", edited by H. W. Dunne. Iowa State College Press (1958): 495-503.

[2]Gelenczei, E. F.: Edema Disease in Pigs. Allied Vet., *30*, (March-April, 1959): 36-39.

[3]Gouge, H. E., and Elliott, R. F.: Edema Disease in Swine. Vet. Med., *54*, (June, 1959): 295-297.

[4]Shanks, P. T.: An Unusual Condition Affecting the Digestive Organs of the Pig. Vet. Rec., *50*, (March, 1938): 356.

[5]Underdahl, N. R., and Young, G. A.: An Improved Hood for Swine Hysterectomies. J.A.V.M.A., *131*, (Sept. 1, 1957): 222-224.

[6]Underdahl, N. R., and Young, G. A.: An Isolation Brooder for Raising Disease-Free Pigs, J.A.V.M.A., *131*, (Sept. 15, 1957): 279-283.

[7]Underdahl, N. R., Blore, I. C., and Young, G. A.: NUD: A Previously Undescribed Disease Distinguishable from Hog Cholera and Swine Erysipelas. J.A.V.M.A., *134*, (April 15, 1959): 367-370.

[8]Young, G. A., Underdahl, N. R., and Hinz, R. W.: Procurement of Baby Pigs by Hysterectomy. Am. J. Vet. Res., *24*, (Jan., 1955): 123-131.

[9]Young, G. A., and Underdahl, N. R.: Isolation Units for Growing Baby Pigs Without Colostrum. Am. J. Vet. Res., *15*, (Oct., 1953): 571-574.

Pityriasis Rosea in Young Pigs

This ringworm-like condition was recently observed for the first time in Yugoslavia. Three pigs showed dermatosis, with roundish, reddish spots with raised borders, on the ventral portions of their abdomen and thorax. The 2 pigs with milder cases recovered spontaneously after two weeks.

In the remaining pig, lesions spread over the adjoining parts of the body, but disappeared after two weeks of treatment with a zinc-vitamin ointment. The exanthema was preceded by a slight diarrhea in all 3 pigs. The etiological agent, presumably a fungus, was not isolated.—*V. Gregorovic in Vet. Glasnik, 13, (Aug., 1959): 638.*

Bovine Hematology. II. Effect of Parturition and Retention of Fetal Membranes on Blood Morphology

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SUCCESSFUL APPLICATION of hematology to diagnosis is dependent on knowledge of the usual responses of the hematopoietic tissues to well-defined physiologic and pathologic states. Parturition, with or without retention of the fetal membranes, is a specific situation in the cow from which it should be possible to determine the typical blood picture.

The animals included in this study were on dairy farms visited by the ambulatory clinic staff of the School of Veterinary Medicine, University of California, Davis. Blood samples were taken from normal cows at parturition, normal postparturient cows, and from cows with retained fetal membranes. A total of 108 samples was collected from 81 cows as follows: 60 cows, one sample; 16 cows, two samples; 4 cows, three samples; and 1 cow, four samples. Retention of fetal membranes occurred in 56 of the 81 cows studied.

The methods of collecting and handling the blood are briefly described in the first paper of this series,[11] and a more detailed description appeared elsewhere.[9]

CLINICAL HISTORY

The data on the blood picture, as influenced by normal parturition, were taken from 11 cows from which blood samples were taken immediately upon delivery of the calf (group B); 12 cows sampled on the first day postpartum (group C); and 8 cows sampled on the second day postpartum (group D). These data, though not extensive, compare favorably with the literature on the subject.[1-7]

It is our practice, in agreement with others,[8] to wait 48 hours postpartum before removal of fetal membranes is attempted. This procedure influenced the distribution of the blood samples as follows: from 21 cows on the second day (group E); 32 cows on the third day (group F); 7 cows on the fourth day (group G); and 7 cows on the fifth day (group H).

About two months postpartum, and after satisfactory recovery from having retained the membranes, blood samples were taken from 10 cows to provide data representative of the normal blood picture of actual animals involved in the study (group J).

Other normal blood values (group A) are the ranges and means established by the clinical pathology department[10] for teaching and reference purposes. These data are based on a combination of literature reports and material gathered by the teaching staff.

The 56 cows that retained the fetal membranes are typical of the usual cases encountered in veterinary practice. The dairymen's only complaint was that the cow "had not cleaned."

Data on clinical signs are presented (table 1). The cows' temperatures were normal or slightly elevated, as were their pulse and respiration rates. The membranes were not ready for removal 48 hours postpartum in 42 per cent of the cows, though rumen motility and appetite were essentially normal. At 72 hours, postpartum, 25 per cent of the cows showed firmly attached membranes, and in 42 per cent rumen motility was decreased. Occasionally, cows were depressed and off-feed. At 96 and 120 hours postpartum, the membranes could be removed easily from all but 1 cow. Milk production appeared to be reduced in cows that retained fetal membranes past the second day postpartum.

RESULTS AND DISCUSSION

The data on both the erythrocytic and leukocytic series are summarized (table 2). The differential leukocyte counts are stated in percentage (table 2) and in absolute numbers (table 3). In addition, the absolute leukocyte numbers are presented in graph form (fig. 1).

No attempt was made to establish levels for the various blood cells as influenced by advanced gestation. The number of each of

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TABLE I—Clinical Signs Associated with Parturition and Retention of the Fetal Membranes

		At parturition (11 cows)	With retention of the fetal membranes: 48 hours postpartum (21 cows)	72 hours postpartum (32 cows)	96 hours postpartum (7 cows)	120 hours postpartum (7 cows)
Temperature (F.)	Average	101.7	102.2	102.6	102.3	101.6
	Maximal	102.0	104.5	105.6	104.0	102.8
	Minimal	101.4	100.0	100.2	101.5	100.2
Pulse/min.	Average	.....	83	97	84	81
	Maximal	.....	120	120	108	104
	Minimal	.....	48	68	60	64
Respiration per minute	Average	.....	32	36	32	29
	Maximal	.....	52	72	48	40
	Minimal	.....	24	20	18	16

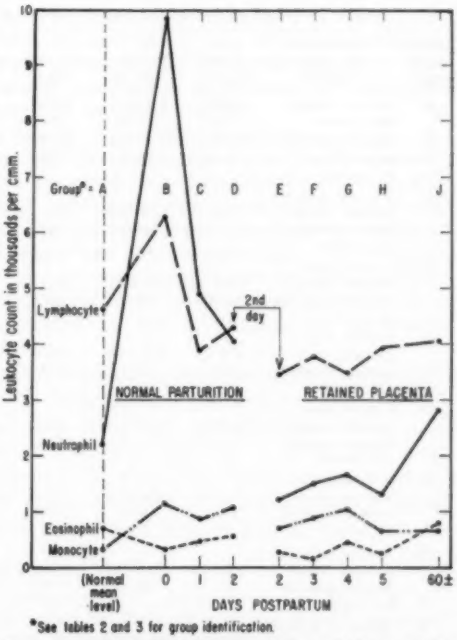
the various cells per cubic millimeter of blood on the day before parturition is not known; therefore, it is necessary to turn to the literature for an indication of the anticipated trend.

The Erythrocytes.—The erythrocyte number, the hemoglobin concentration, and the volume per cent of erythrocytes (table 2) showed a definite increase at parturition and remained elevated during the first 24 hours postpartum. By the second day, these values had begun to recede toward more normal levels. The erythrocyte mass in the cow as determined by the hematocrite method has been reported[12] to increase at the time of parturition and then to decline gradually with the lowest level at postpartum days 15 to 30. The increase in circulating erythrocytes and hemoglobin at parturition may possibly be the result of a combination of reduced water intake and contraction of the spleen, with a forcing of sequestered erythrocytes into the blood stream. When the stress of calving is over and normal water balance is re-established, the erythrocyte number and hemoglobin concentration may fall below the normal mean level, because of loss of blood from hemorrhage during calving.

Total Leukocyte Count.—The normal mean total leukocyte count for cattle not under stress is about 8,000 cells/cmm. of blood. Work of others[2-4,7] has revealed a gradual increase in leukocyte number in the last weeks of gestation, with a marked rise on the day preceding parturition and a second significant increase on the day of calving. Leukocyte numbers fall sharply in the first 24 hours postpartum, with a more gradual decline thereafter, reaching normal levels on days 4 to 6 postpartum.[4]

The current data begins with 11 cows (group B) at the moment of delivery of the calf. The mean total leukocyte count was 17,750/cmm. with a maximum of 24,700/cmm. These are higher levels than reported by others at parturition, but the 11 blood samples were drawn at the peak of stress or immediately after delivery of the calf. On days 1 and 2 postpartum, mean total leukocyte counts dropped to 10,000/cmm. with maximum counts of 18,000 and 14,700/cmm. respectively.

The Differential Leukocyte Count. The administration of ACTH or adrenocortical



*See tables 2 and 3 for group identification.

Fig. 1—Absolute leukocyte numbers as influenced by normal parturition or parturition with retained placenta.

hormones to cows results in a leukocyte blood picture similar to that associated with normal parturition.[3] Thus, the leukocyte blood picture associated with parturition may be interpreted as a response to stress. Adrenocortical secretion typically brings about an elevation of circulating neutrophils, and at the same time there is a fall in number of lymphocytes and eosinophils.

We may assume that the adrenal cortex of the 11 cows had been actively secreting for several hours prior to expulsion of the fetus. Thus, the marked neutrophilia and eosinopenia (fig. 1, group B) are typical of the response to stress. The mean lymphocyte value was well above the normal mean value for cows not in a state of stress, but probably not above the level to be anticipated for the day preceding parturition. Actually, it is not known from the current data whether the lymphocyte count was dropping from a higher level or increasing from a lower level, although a fall in lymphocyte number on the day of calving should be anticipated and has been so reported.[4]

On the first day following normal calving (group C), a spectacular fall in neutrophils was recorded; this decrease continued into the second day (group D). If blood samples had been collected for several more days, a return of absolute neutrophil numbers to normal by postpartum days 4 to 6[4] would possibly have been demonstrated. The lymphocytes also decreased significantly on day 1 postpartum, and this was followed by a slight increase on day 2. The mean absolute count for lymphocytes on day 2 was between the absolute mean normal values for groups A and J. The number of eosinophils began to increase by day 1 postpartum and continued upward on day 2. An absolute monocytosis, relative to normal parturition, was observed at all three points in the data (fig. 1).

The data on total and differential leukocyte counts in relation to normal parturition were terminated in this study on day 2 postpartum, whereas the data in relation to retained fetal membranes begin with that day. Thus, the former may serve as

TABLE 2—Effect of Parturition and Retention of the Fetal Membranes on the Blood Picture in Cattle

Group identification	History of the blood samples	r.b.c. x 10^6 /cmm.	Hb. Gm. /100 ml.	Vol.(%) r.b.c.	w.b.c.x10^3 /cmm.	Meta.[1] (%)	Band (%)	Neut. (%)	Lymph. (%)	Mono. (%)	Eos. (%)	Bas. (%)
A	Normal range[3] 2nd (mean)	5.0-10 (7.0)	8.0-14.0 (11.0)	24-48 (35)	4.0-12.0 (8.0)	0	0.0-2.0 (0.5)	15-45 (28.0)	45-75 (58.0)	2.0-7.0 (4.0)	2.0-20.0 (9.0)	0-2 (0.5)
B	Blood drawn at parturition. (11 cows)	5.5-9.3 (7.4)	8.7-15.3 (13.2)	24-44 (40)	11.8-24.7 (17.7)	0	0.0-2.0 (0.8)	13-68 (55.4)	25-67 (34.6)	2.0-12.0 (7.4)	0.0-9.0 (1.8)	0
C	One day postpartum, membranes dropped. (12 cows)	6.0-8.9 (7.1)	11.8-15.4 (13.4)	35-45 (40)	5.7-18.0 (10.0)	0	0.0-3.5 (0.9)	29-61 (47.3)	28-59 (39.8)	2.5-11.5 (7.7)	1.0-12.0 (3.9)	0-1
D	2 days postpartum, membranes dropped. (8 cows)	5.6-6.8 (6.2)	10.5-14.3 (12.6)	32-43 (37)	4.9-14.7 (10.0)	0	0.0-3.0 (0.9)	15-55 (38.6)	26-61 (41.8)	6.0-16.0 (10.9)	0.5-17.0 (7.2)	0-2 (0.5)
E	2 days postpartum, membranes retained. (21 cows)	4.9-12 (6.9)	9.5-21.0 (12.1)	30-68 (38)	3.3-9.2 (5.7)	0-5 (0.6)	0.0-24.0 (6.0)	3-35 (14.5)	30-87 (61.3)	1.0-32.0 (11.7)	0.0-21.0 (5.3)	0-2 (0.3)
F	3 days postpartum, membranes retained. (32 cows)	4.9-7.9 (6.4)	9.6-14.9 (11.7)	28-46 (34)	3.4-14.6 (6.6)	0-4[2] (1.0)	0.0-22.0 (7.5)	2-46 (17.5)	24-90 (55.9)	2.0-29.0 (13.9)	0.0-10.0 (3.7)	0-2 (0.3)
G	4 days postpartum, membranes retained. (7 cows)	4.9-7.1 (6.1)	8.8-11.9 (10.6)	28-36 (33)	3.4-9.4 (6.7)	0-3 (0.7)	1.0-10.0 (4.3)	5-47 (17.6)	28-60 (55.7)	2.0-38.0 (15.0)	0.0-32.0 (6.7)	0
H	5 days postpartum, membranes retained. (7 cows)	5.8-10.0 (7.1)	10.6-11.9 (11.3)	32-37 (35)	3.6-8.0 (6.1)	0	0.0-13.0 (2.7)	4-25 (20.3)	41-89 (62.2)	2.0-26.0 (10.0)	1.0-8.0 (4.8)	0
J	About 2 months postpartum following retained membranes (10 cows)	5.8-8.2 (6.5)	10.9-13.3 (11.6)	31-42 (36)	6.0-11.1 (8.5)	0	0.0-4.0 (0.5)	17-46 (34.7)	30-66 (47.7)	2.0-10.0 (7.2)	1.0-26.0 (9.9)	0-1 (0.2)

[1]=Metamyelocytes; [2]=in addition, myelocytes appeared in 4 cows in 0.5 to 2.0 per cent of the differential count; [3]=normal values for cattle as established by Department of Clinical Pathology, School of Veterinary Medicine, University of California.

TABLE 3—Effect of Parturition and Retention of the Fetal Membranes on the Absolute Leukocyte Number in Bovine Blood

Group identification	History of the blood samples	Total leukocyte count/cmm.	Total neutrophils	Lymphocytes	Monocytes	Eosinophils
A	Normal range and mean.[1]	4,000-12,000 (8,000)	600-5,640 (2,280)	1,800-9,000 (4,640)	80-840 (320)	80-2,400 (720)
B	Blood drawn at parturition, 11 cows.	11,800-24,700 (17,750)	2,060-16,050 (9,900)	3,260-11,050 (6,380)	190-1,890 (1,190)	0-1,480 (340)
C	24 hours postpartum, fetal membranes dropped, 12 cows.	5,700-18,000 (10,000)	2,660-10,800 (4,900)	2,060-6,490 (3,950)	150-2,070 (833)	57-1,044 (410)
D	48 hours postpartum, membranes dropped, 8 cows.	4,900-14,700 (10,000)	1,320-7,450 (4,080)	1,250-6,095 (4,270)	400-1,590 (1,060)	75-1,180 (575)
E	48 hours postpartum, membranes retained, 21 cows.	3,300-9,200 (5,700)	230-2,480 (1,210)	1,430-6,670 (3,470)	0-2,070 (708)	0-1,930 (315)
F	72 hours postpartum, membranes retained, 32 cows.	3,400-14,600 (6,600)	235-5,625 (1,700)	1,360-13,140 (3,800)	215-2,295 (922)	0-590 (208)
G	96 hours postpartum, membranes retained, 7 cows.	3,400-9,400 (6,700)	635-4,615 (1,620)	2,585-4,800 (3,550)	180-3,530 (1,044)	0-2,224 (450)
H	120 hours postpartum, membranes retained, 7 cows.	3,600-8,000 (6,100)	295-1,920 (1,330)	1,908-6,585 (3,980)	108-1,768 (605)	67-544 (290)
J	About 2 mo. postpartum following retained membranes, 10 cows.	6,000-11,100 (8,500)	1,830-3,690 (2,845)	2,620-7,160 (4,050)	90-1,200 (708)	78-2,100 (720)

[1]=Normal data for blood of cattle as established by the Clinical Pathology Department, School of Veterinary Medicine, University of California, Davis.

control values for the latter. A comparison of the points (fig. 1) for groups D and E clearly reveals that retention of the fetal membranes has a distinct depressing effect on all leukocyte types, with the greatest effect being on the neutrophils. In addition, a shift to the left appeared in the neutrophil series (table 3). The mean percentage of band forms was 6.0, 7.5, 4.3, and 2.7 on retained fetal membranes days 2, 3, 4, and 5 respectively; metamyelocytes were present on days 2, 3, and 4, and the shift included myelocytes on day 3. In 7 cows, with retained fetal membranes on day 5, the mean absolute numbers for neutrophils, eosinophils, and monocytes decreased while the lymphocytes increased.

All leukocyte types except the monocytes were found to be at their normal mean levels in blood from 10 cows at about two months after parturition with retention of the fetal membranes. Although the mean absolute monocyte number fluctuated between the separate groups of blood samples, an absolute monocytosis was present at all times. The association of monocytosis with retained membranes had been reported previously, as well as a shift to the left in the neutrophils series;[5] however, an increase in monocytes in association with normal parturition had not been reported in the literature reviewed.[3,4,7]

SUMMARY

The total and differential leukocyte counts of normal parturition in cattle are typical of the response to stress. The total leukocyte counts were significantly elevated, mainly through a marked increase in neutrophils, although the lymphocytes were also increased. Eosinophils were depressed and monocytes increased. By the first day postpartum, the total count had fallen sharply, although some cows displayed total counts above the maximum normal level. This fall in leukocyte numbers was due to significant reductions in both neutrophils and lymphocytes.

When the fetal membranes were retained, blood samples drawn on the second day revealed that the numbers of all leukocyte types were depressed below the levels on the second postpartum day in cows that dropped the fetal membranes. The depression was most marked for the neutrophils; immature forms of neutrophils (left shift) appeared in the circulation at the same time.

An absolute monocytosis was associated with both normal parturition and the retaining of fetal membranes, while the mean absolute number of monocytes was found to be above the mean normal level in 10 cows checked two months after fetal membranes had been retained.

References

[1]Ferguson, L. C., Irwin, M. R., and Beach, B. A.: The Effect of Parturition on the Blood Picture of Cows in Health and During Infection with *Brucella abortus*. Am. J. Vet. Res., 2, (Oct., 1941): 394-399.

[2]Kerr, W. R., Robertson, M., and McGirr, J. L.:

A Study of the Reaction of the White Blood Corpuscles in Bovines at Parturition with a Consideration of the Evidence of the Action of the Adrenal Cortical Hormone (Cortisone). J. Hyg., *49*, (1951): 67-80.

[3]Merrill, W. G., and Smith, V. R.: A Comparison of Some Cellular and Chemical Constituents of Blood at Time of Parturition and After Administration of Adrenocorticotrophin. J. Dai. Sci., *37*, (1954): 546.

[4]Moberg, R.: The White Blood Picture in Sexually Mature Female Cattle with Special Reference to Sexual Conditions. A Clinical and Experimental Study. Thesis. Stockholm, Sweden, 1955.

[5]Moore, G. R.: The Blood Picture in Cases of Retained Fetal Membranes in Cattle. J.A.V.M.A., *109*, (July, 1946): 39-45.

[6]Morris, P. G. D.: Blood Picture of the Cow During Normal Pregnancy and Parturition. Brit. Vet. J., *100*, (1944): 225-233.

[7]Paterson, J. Y. F.: 17-Hydroxycorticosteroids and Leukocytes in the Blood of Dairy Cattle. J. Comp. Path., *67*, (1957): 165-179.

[8]Roberts, S. J.: Veterinary Obstetrics and Genital Diseases. Published by the author. Ithaca, N.Y., (1956): 229.

[9]Schalm, O. W.: The Blood and Blood-Forming Organs. In "Diseases of Cattle." American Veterinary Publications, Inc., Evanston, Ill. (1956): 355-383.

[10]Schalm, O. W.: A Syllabus on Veterinary Hematology. Published by the author, Davis, Calif., 1959.

[11]Theilen, G. H., Schalm, O. W., Straub, O. C., and Hughes, J. P.: Bovine Hematology. I. Leukocyte Response to Acute Bovine Mastitis. J.A.V.M.A., (Nov. 1, 1959): 481-485.

[12]Van Soest, P. G., and Blosser, T. H.: A Detailed Study of Levels of Certain Blood Constituents in Normally Calving Dairy Cows and in Dairy Cows with Parturient Paresis. J. Dai. Sci., *37*, (1954): 185.

Sheep Drenching Technique

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New Augusta, Indiana

THE PROPER method for administering liquid medication to sheep is important to veterinarians, since some types of medication should be introduced into the abomasum, while others should be introduced into the rumen. The three common methods for administering liquids to sheep are: rapid oral drenching, slow oral drenching, and the esophageal tube technique. In the rapid technique, the contents of the syringe are quickly discharged over the base of the animal's tongue while its nostrils are held closed by the operator. With the slow technique, the animal is allowed to drink the liquid material as it flows slowly from the syringe into the mouth. The esophageal tube procedure involves the use of a 6- to 8-inch rubber tube on the end of the dose syringe. The tube is introduced, through the mouth, into the anterior portion of the esophagus and the contents of the syringe discharged.

A test was conducted with 9 normal sheep using a dyed 15 per cent suspension of diphenthane-70 (Teniatol*) to find out where this material would be deposited when the three different drench techniques were used. Each procedure was used on 3 lambs weighing 44 to 90 lb. They were killed shortly after dosing and the digestive tract was examined for dyed material (table 1).

TABLE 1—Results of Drenching Sheep with Dyed Teniatol

Animal (No.)	Dosage volume (cc.)	Interval between dosing and necropsy (min.)	Method	Location of dyed suspension
1	27	5	Rapid	Drench deposited in abomasum; stained esophagus and esophageal groove.
2	22	10	Rapid	Abomasum stained; suspension in 1st 6 in. of small intestine.
3	25	15	Rapid	Abomasum and 1st 24 in. of small intestine stained.
4	25	5	Slow	Drench deposited in abomasum; stained esophagus and esophageal groove.
5	31	10	Slow	Abomasum stained, suspension in 1st 18 in. of small intestine.
6	25	15	Slow	Abomasum stained.
7	27	5	Esophageal tube	Contents of reticulum stained, as well as esophagus and portion of the reticulum and rumen wall. None in abomasum.
8	22	10	Esophageal tube	Contents of rumen and reticulum stained; none in abomasum.
9	25	15	Esophageal tube	No stain in abomasum.

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*Teniatol is a trademark of Pitman-Moore Co., Division of Allied Laboratories, Inc., Indianapolis, Ind.

RESULTS

The results (table 1) of this limited test indicated that if it is desired to introduce liquid medication directly into the abomasum, either the rapid or the slow technique should be used. Introduction of the tube into the esophagus resulted in the material going into the reticulum.

The rapidity with which the medication progressed down into the small intestine was unexpected.

These results were obtained without the prior use of copper sulfate to close the esophageal groove.

SUMMARY

Lambs given a dyed 15 per cent suspension of diphenthane-70 (Teniatol) by means of either the slow or rapid technique, and killed soon after, had the suspension in the abomasum; those given the drench by means of an esophageal tube had the medication in the reticulum but not in the abomasum.

An Abdominal Tumor in a Dog—A Case Report

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Lancaster, Wisconsin

A female English Pointer, 5 years old, was examined because of a steadily enlarging abdomen. The owner reported that he first noticed the enlargement approximately one week previously.

Radiographs revealed a mass which seemed to almost completely occupy the abdominal cavity. A tentative diagnosis of malignant neoplasm was made and an unfavorable prognosis was given.

Presurgical preparations were made for laparotomy in the usual manner. Preanesthetics were administered and sodium pentobarbital was given intravenously. It was necessary to incise the abdominal wall from the xiphoid cartilage to the symphysis pubis in order to expose the tumor (fig. 1) and effect its removal. During the course of the operation, it became necessary to administer whole blood because of hemorrhage.

Once the large tumor had been removed,

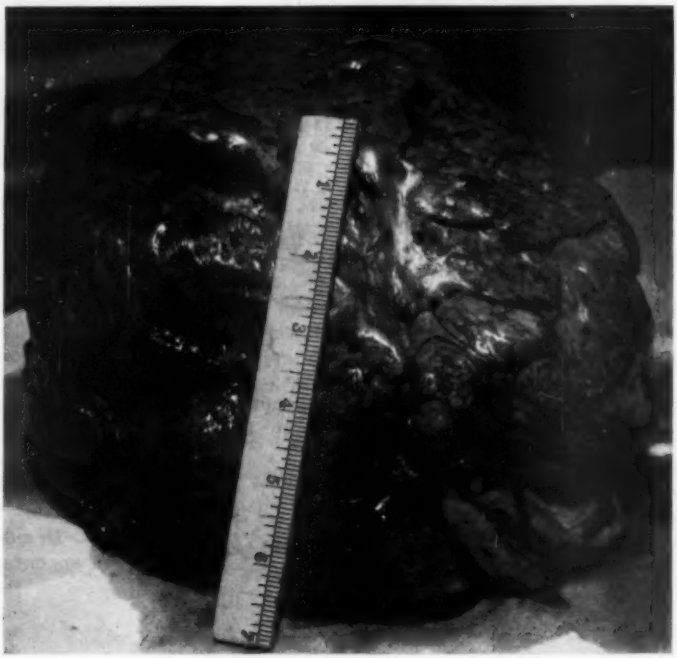


Fig. 1—Tumor taken from the abdomen of a 5-year-old female English Pointer.

further examination revealed that many other rather extensive growths involved the parietal peritoneum. Because of the hopelessness of the case, the owner gave consent for euthanasia.

The tumor mass weighed 11¾ lb. and was approximately 14 inches at its greatest diameter. Microscopic examination later revealed the tumor to be a squamous cell carcinoma.

Inguinal Hernias in Female (Hermaphrodite) Pigs—A Case Report

D. W. GREGORY, D.V.M.

Washington, Iowa

Although the incidence of inguinal hernias in male pigs is high, the anomaly is comparatively rare in females.[1]

During a recent serum and virus vaccination of a drove of 233 pigs averaging about 40 lb., 8 female pigs were observed to have inguinal hernias (fig. 1); none of the boar pigs were affected. The 8 herniated females were later brought to the office for surgery (fig. 2).

Fig. 1—Posterior view of a hermaphrodite pig with bilateral hernia.

In reducing the hernias of the first 4, incisions were made directly external to the inguinal rings. After separating the peritoneal sacs from the subcutaneous adhesions, the sacs and their contents were returned to the abdominal cavities and the inguinal rings closed with umbilical tape.

The fifth pig had a movable mass about the size of a testicle exterior to the inguinal ring on the nonherniated side. Palpation of the hernial sac on the other side also revealed a nodule resembling a testicle. Before reducing the hernia, the nodular masses of both sides were removed. Objects, similar in appearance to testicles, were also

Fig. 2—Ventral view of same pig pictured in figure 1.

Fig. 3—Same pig pictured in figures 1 and 2 following reduction of hernias. The gonads have been placed anterior to incisions.

Dr. Gregory is a general practitioner in Washington, Iowa.

present bilaterally in the remaining 3 pigs and were removed (fig. 3).

When compared with an ovary (0.3 Gm.) from a normal female pig of approximately

Fig. 4—Gonad from herniated hermaphrodite pig at left compared with much smaller normal ovary on the right.

the same size, one of the gonads from a herniated pig was much larger (3.6 Gm.).

Gonads from each of 2 pigs were fixed in 10 per cent formalin and sent to the School of Veterinary Medicine, Iowa State University, Ames, for histologic examination. Histologically, the organs were testicles indicating that the pigs were hermaphrodites.*

The external genitalia (vulvas) of these 8 pigs appeared to be normal female structures. As all of the pigs recovered satisfactorily from the surgery, none were available for postmortem examinations.

*Histologic report given by Dr. John C. Peckham, Department of Veterinary Hygiene, Iowa State University, Ames.

[1]Guard, W. F.: Surgical Principles and Techniques. Edwards Bros., Inc., Ann Arbor, Mich., 1953.

Recommended Tetanus Prophylaxis and Therapy

Tetanus toxoid is one of the most effective and innocuous immunizing agents known. It should be administered in at least three doses of fluid toxoid or two doses of precipitated toxoid in order to establish acceptable primary immunization. Basic immunization may not be regarded as complete until an additional reinforcing dose is given, preferably six to 12 months after primary immunization.

Immunity to tetanus, once established by adequate basic immunization, should be maintained at a protective level by periodic booster doses at intervals of four to five years.

In patients without a valid history of adequate tetanus toxoid immunization, tetanus antitoxin must be employed for emergency prophylaxis of tetanus-prone injuries. The usual recommended dose of 1,500 units does not give entirely reliable protection, and a dose of 3,000 to 5,000 units is recommended when prophylaxis of tetanus is medically indicated. This dose should be increased if complete debridement is impractical or if significant delay has occurred in treating the injury. This increase in presence of complications or delay of more than one day should be in the range of 6,000 to 10,000 units of antitoxin.—*J. Am. M. A., 171, (Sept. 26, 1959)*: 427.

Diagnosing Bovine Leukosis

The diagnostic value of a hematological examination for bovine leukosis has been studied in Denmark. From 80 to 85 per cent of the bovine leukosis in Denmark is found in certain herds, where it occurs regularly. In such herds, many apparently normal animals show leukemic blood (a high percentage of lymphocytes). The other 15 to 20 per cent were isolated cases with no tendency to spread. They may have been due to a different cause.

Attempts to eradicate leukosis from large herds have shown promising results, but these can not be finally evaluated for another four to five years. To prevent further spreading of the disease when affected herds are identified, sale of breeding animals from these herds should be prohibited and contact with other herds prevented.—*H. J. Bendixen in Off. internat. des Epizoot., 52, (May, 1959): 282.*

Corneal Opacity of Cattle Heritable

Opacity of the cornea in cattle may be an hereditary defect transmitted through a recessive character. This type of corneal opacity has no relation to previous inflammatory reaction.

Histologic examination of affected eyes indicates that the corneal lesion is primarily an edema of the propria with loosening and disruption of the laminae.

The abnormality is noticed at birth or soon after and takes the form of a cloudiness of the whole cornea which appears as a light smoky blue color. Both eyes are always affected. Few calves are totally blind but their sight is severely restricted. —*Vet. Rec., 71, (Sept. 19, 1959)*: 619.

Editorial

The Need for Disease-Free Pigs

Swine, because of their peculiar mode of living and eating, are more affected by sanitary conditions than are other domesticated animals. Thus, we may accept the truism that *sanitation is to swine raising as asepsis is to surgery.*

Until recent years, when poultry raising became largely "integrated," no species has been produced in greater concentration than have swine (*see* map, JOURNAL, Sept. 15, 1958: 346). The proximity of herds, as seen in the nation's cornbelt, makes it possible for communicable diseases to spread rapidly.

THE INCREASE IN SWINE DISEASES

Prior to World War I, little was known about any swine disease except hog cholera, the threat of which had limited the breeding of swine until prophylactic measures were developed. The only other frequently mentioned disease was *swine plague,* a dubious diagnosis of a pulmonary disease which was supposedly due to a Pasteurella infection. The exceptional effectiveness of vaccination against cholera made expansion of swine production possible when farmers were urged to do so during the war years.

Many other serious, communicable swine diseases have appeared since that time. These include both acute (influenza, swine dysentery, septicemic erysipelas, and transmissible gastroenteritis) and chronic (atrophic rhinitis, erysipelas arthritis, and recently recognized viral pneumonia) diseases.

Because of substantial profits made by raising more swine during World War I, while using inexpensive, improvised equipment and methods, many producers built elaborate hog houses, hoping to continue their expanded production. However, some of these expensive buildings eventually could have been classified better as swine mausoleums than as swine palaces. The buildings could easily be kept clean but efforts to keep the surrounding yards sanitary often failed and losses from enteric and parasitic disease became serious. Chronic pulmonary diseases also increased, largely due to the drafty conditions in the high-ceilinged, cement-floored, steel-bar-partitioned buildings.

Losses from these diseases combined with the drop in prices, due to the severe post-war agricultural depression which started in 1920, resulted in abandonment of many of these architectural monstrosities. More practical, back-to-nature methods of raising swine, featuring temporary straw sheds on "clean ground," then came into vogue.

PROCURING DISEASE-FREE PIGS

Many diseases could be avoided by changing the environment, especially when new breeding stock was obtained from apparently disease-free herds. However, chronic diseases, such as atrophic rhinitis, viral pneumonia, and internal parasites, which may be present but occult, are difficult to eliminate by such methods. Thus, there was developed the method of obtaining, by hysterectomy and strict isolation, pigs actually free of all nonheritable and noncongenital disease. Although first done to get pigs for research purposes, this method promises to be of major importance in establishing disease-free herds.* It may prove to be too laborious and expensive for use on a large scale but would seem to be imperative for acquiring foundation stock when swine are to be produced on an "integrated" basis.

Probably the most important reason why domesticated mammals can never be raised by "integrated" methods as readily as are birds is the impracticality of preventing contact between the possibly infected dams and their young. In the case of poultry, the incubation of eggs can break the chain of infection. With swine, only by expensive measures can exposure of the pigs be prevented. The shorter the period of exposure the better, but even if pigs were allowed to nurse for only a few days, to get the colostrum, they would be apt to contract serious diseases. There is evidence that pigs are unlikely to contract atrophic rhinitis after they are a week old.

The demonstrated success in procuring the young of mammals without extrauterine contact with their dams is a remarkable step forward in animal breeding. For swine, it far exceeds the importance of the preceding great forward step—artificial insemination.—W. A. AITKEN, Editor Emeritus.

*A conference on Swine Repopulation will be held at the University of Nebraska, Feb. 3-5, 1960 (see Nov. 15, 1959, JOURNAL, p. 534).

Abstracts

Urethral Epithelium of Domestic Animals

The epithelial lining from 41 urethrae of seven species presented morphological differences in different species, but at places it was similar in all animals, making species differentiation difficult.

Near the bladder all animals had a transitional lining. The penile urethra showed great epithelial variations, while the pelvic urethra had mostly transitional epithelium in all animals except the buck, dog, and tomcat. In these, only stratified columnar epithelium occurred near the bulb and a mixture of stratified columnar and transitional was present in the middle part. In the bull, a transitional epithelium characterized by intercellular bridges extended proximally to the sigmoid flexure. The ram lambs had the highest typical stratified squamous epithelium of all males. It extended from the penile to the pelvic urethra but changed to transitional near the bladder. In the rest of the males, the bull had the highest epithelium, followed in decreasing order by the stallion, dog, boar, buck, ram, and tomcat.

In the females, the mare had the highest epithelium; the ewe, cow, doe, sow, queen, and bitch followed in decreasing order. Only the mare, doe, ewe, and queen had stratified squamous epithelium at the external urinary orifice, while the others presented stratified cuboidal or even transitional epithelium. The epithelium was similar in the ewe and doe, and bitch and queen. In the queen, the transitional epithelium was interrupted by patches of stratified squamous epithelium.

The urethral part most prone to expansion tended to have a transitional lining. Both intra-epithelial cysts and "narrow cells" were frequently seen. Fibroblast-like cells extended from the lamina propria into the epithelium of cattle and horses. Their exact nature and function could not be established. Goblet cells occurred only in swine, but all species exhibited mucoid secretory activity. Intra-epithelial lymphocytic migration appeared normal in all animals.

The epithelium was generally highest at the two urethral orifices and was lowest in the middle part of the urethra.—[*M. B. Bharadwaj and M. L. Calhoun: Histology of the Urethral Epithelium of Domestic Animals. Am. J. Vet. Res., 20, (Sept., 1959): 841-851.*]

Morphologic Studies of Anaplasma marginale

In an effort to elucidate the controversial nature of *Anaplasma marginale,* morphologic studies were carried out by phase contrast microscopy using erythrocytes from both naturally and experimentally infected cattle. Since hemoglobin masked the parasite, blood was hemolyzed with specific hemolysin, saponin, or by freezing and thawing.

Instead of the punctiform bodies seen in erythrocytes stained with Romanowsky's stains, the majority of the anaplasmata appeared as a knob-like portion or "head" to which was attached a filamentous structure in the form of a ring or a tail. This same morphology was seen with the electron microscope. These findings confirmed observations by several investigators, never generally accepted, of occasional parasites with a tail-like projection in stained blood smears.

The anaplasmata exhibited a swimming or amoeboid movement, a property hitherto undescribed, which may be important in classifying the parasite and in explaining the mechanism of invasion and the marginal position in the erythrocyte.

The usual failure to observe the filamentous portion of Anaplasma in stained preparations may be due to its fragility, low avidity for stains, and its being masked by hemoglobin. It is also possible that there are different strains of *A. marginale* which may show differences in morphology and motility. In the light of these observations, it seems justifiable to consider *A. marginale* a true parasite, probably belonging to the Protozoa.—[*C. Espana, E. M. Espana, and D. Gonzalez: Anaplasma Marginale. I. Studies with Phase Contrast and Electron Microscopy. Am. J. Vet. Res., 20, (Sept., 1959): 795-805.*]

Books and Reports

The Arterial Wall—Aging, Structure, and Chemistry

This monograph is an excellent review of the data currently available concerning the structure, function, and chemistry of the important components of the arterial wall. At the same time, the gaps in current knowledge concerning the arterial wall are readily seen.

As in many recent publications, this volume is compiled by 13 contributing authors and edited by one of them. The work was sponsored by the Gerontological Society, Inc.

Chapter I begins with the vasa vasorum of arteries and their demonstration and distribution as determined from studies in man, dog, and rabbit. This chapter is followed by an enlightening presentation on the vascular endothelium.

Topics discussed in succeeding chapters include perspectives in the study of arterial muscle (one can only conclude that future research on arterial muscle will be rewarding); collagen and ground substance; elastic tissue; the mucopolysaccharides of arterial tissue; studies on enzymes in arterial tissue; and lipid metabolism of connective tissue as related to vascular aging and metabolism of the arterial wall.

The monograph, as a whole, is well written and recommended to veterinarians doing research in gerontology, cardiovascular physiology, and histology and pathology of the arterial wall.—[*The Arterial Wall. Edited by Albert I. Lansing. 259 pages. Williams and Wilkins Co., Mt. Royal Ave., Baltimore, Md. 1959. Price $7.50.*]—W. G. VENZKE.

THE NEWS

Veterinary School Enrollment 1959-1960 and Faculty Changes

Student enrollment at the schools and colleges of veterinary medicine in the United States and Canada has remained at approximately the same level for the past six years. See figures below:

1954-1955	3,733
1955-1956	3,732
1956-1957	3,754
1957-1958	3,797
1958-1959	3,751
1959-1960	3,778

This year a freshman class was enrolled at Purdue University, bringing the number of first year veterinary students to an all-time high of 1,058 (table 1).

The number of veterinarians engaged in graduate study is 36 more than last year, having increased threefold since 1948 (graph 1, p. 629).

Of the 1,058 first-year veterinary students, 54 per cent had three or more years of professional training; 286 had bachelor degrees; 28 had master degrees; and one had a Ph.D. degree. The 1,058 freshmen were selected from approximately 2,000 applicants.

Women Students

Of the 103 women enrolled at veterinary colleges this year, 38 are freshmen; 23—sophomores; 21—juniors; and 21—seniors.

Below and on succeeding pages are the various changes in veterinary personnel in the faculties of 19 out of the 20 schools and colleges of veterinary medicine in the United States and Canada, which were reported to us for the 1959-1960 school year.

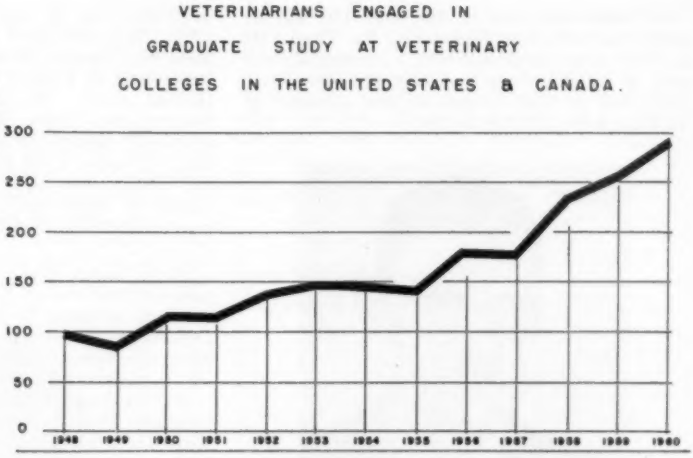
New York State Veterinary College, Cornell University, reported that no new appointments above research associate had been made in the past year. The last account of faculty changes appeared in the JOURNAL, Dec. 15, 1958, pp. 619-623.

Auburn University

Recent appointments at the School of Veterinary Medicine at Auburn University are as follows: Drs. James E. Neal (API '51), head professor, Department of Bacteriology; Fred G. Schell (API '41), head professor, Department of Large Animal Surgery & Medicine; David S. Elsasser, (OSU '35), associate professor, Department of Small Animal Surgery & Medicine; Aaron H. Groth, Jr. (API '54), associate professor, Department of Pathology & Parasitology; Robert D. Whiteford (GA '51), associate professor, Department of Anatomy & Histology; George W. Teresa (A. & M. College of Arkansas '59), assistant pro-

TABLE 1—Veterinary Student Enrollment for the Academic Year 1959—1960

Schools	Fresh.	Soph.	Jun.	Sen.	TOTAL 1959	TOTAL 1958	Change	Spec.	Grad.
Auburn University	54	64	55	45	218	217	+ 1	1	9
California, University of	49	51	50	47	197	202	− 5	4	13
Colorado State University	71	63	62	65	261	263	− 2	..	12
Cornell University	60	60	53	46	219	210	+ 9	2	31
Georgia, University of	53	57	56	61	227	235	− 8	2	....
Illinois, University of	45	34	34	42	155	147	+ 8	1	29
Iowa State University	65	62	62	59	248	258	−10	2	26
Kansas State University	68	59	65	69	261	275	−14	1	9
Michigan State University	64	61	62	59	246	236	+10	..	31
Minnesota, University of	48	41	43	44	176	181	− 5	..	27
Missouri, University of	30	31	25	29	115	114	+ 1	1	13
Montreal (Quebec), University of	28	30	17	28	103	100	+ 3	..	2
Ohio State University	75	68	68	62	273	273	.....	..	14
Oklahoma State University	44	35	35	38	152	154	− 2	..	12
Pennsylvania, University of	56	48	48	40	192	191	+ 1	..	7
Purdue University	50	....	....	....	50	.....	+50	2	18
Texas, A. & M. College of	63	51	50	58	222	223	− 1	4	17
Toronto (Ontario), University of	69	51	50	41	211	203	+ 8	4	11
Tuskegee Institute	16	21	16	15	68	82	−14	..	....
Washington State University	50	43	44	47	184	187	− 3	2	7
TOTAL	1,058	930	895	895	3,778	3,751	+27	26	288



Graph I—The number of veterinarians engaged in graduate study has increased threefold since 1948.

fessor, Department of Bacteriology; Robert D. Horne (API '59), instructor, Department of Small Animal Surgery & Medicine; J. Malcolm Kling (GA '59), instructor, Department of Physiology & Pharmacology; Benjamin T. Robertson, Jr. (University of Kentucky '57), instructor, Department of Physiology & Pharmacology; and Jude L. Swalley (KSC '56), instructor, Department of Small Animal Surgery & Medicine.

DR. JAMES E. NEAL APPOINTED HEAD PROFESSOR OF THE DEPARTMENT OF BACTERIOLOGY AT A. U.—Dr. James E. Neal has been appointed head professor of bacteriology at A. U. Born in Clay County, Miss., he attended the public schools there and received his B.S. degree in agricultural education from Mississippi State University.

Dr. Neal served one year with the U.S. Army at Fort McClellan, Ala., in 1936-1937, after which he taught vocational agriculture at Sylacauga, Ala., from 1937 to 1941. He then entered the U.S. Army as a first lieutenant in February, 1941, and participated in the European campaign with the Fourth Infantry Division. Promoted to a lieutenant colonel in 1946, he was relieved from active duty in July, 1946.

Receiving his D.V.M. degree from Alabama Polytechnic Institute in 1951, Dr. Neal began his practice in Charlotte, N. Car. In October of the same year, he was appointed assistant professor of bacteriology at Auburn.

Dr. Neal did graduate work at the University of Kentucky in the summer of 1954 and at the A.&M. College of Texas in 1956-1957. He received his M.S. Degree in veterinary microbiology from the A.&M. College of Texas in 1957, and became associate professor of bacteriology at Auburn the same year.

Dr. James E. Neal

He is a member of the AVMA, the Alabama V.M.A., the American Association of Veterinary Bacteriologists, Omega Tau Sigma, Phi Kappa Phi, Phi Zeta, and Alpha Zeta.

DR. FRED G. SCHELL BECOMES HEAD OF THE DEPARTMENT OF LARGE ANIMAL SURGERY & MEDICINE AT A. U.—Three years after joining the Department of Large Animal Surgery & Medicine, Dr. Fred G. Schell was made head professor of the Department in 1959.

Dr. Schell was born in Ambridge, Pa., and attended high school in Greensburg, Pa. From 1928 to 1931, he was associated with a commercial company in its advertising and sales procedures and, from 1932 to 1936, he was assistant manager of the Detroit Hunt and Polo Club.

Dr. Fred. G. Schell

In 1936, he entered Alabama Polytechnic Institute for his preveterinary and veterinary education, graduating in 1941. After graduation, Dr. Schell engaged in private practice in Franklin, Tenn., for 15 years. He joined A.P.I.'s Department of Large Animal Surgery and Medicine in 1956.

California, University of

New members of the faculty of the School of Veterinary Medicine at the University of California include: Drs. Leslie A. Page (Ph.D., CAL '56), research microbiologist, Department of Avian Medicine; Marvin Goldman (Ph.D., University of Rochester '57), associate research radiobiochemist I; Robert M. Johnson (TUS '58), assistant research veterinarian; Richard J. Brown (ILL '56), lecturer, Department of Medicine and Surgery; and James C. Blakemore (MSC '59), and Donald G. Morgan (CAL '59), assistant specialists in the Department of Medicine and Surgery.

Colorado State University

Newly made appointments in the College of Veterinary Medicine at Colorado State University are as follows: Drs. L. Keith Wayt (COL '46), head professor, Department of Veterinary Medicine; Alvin B. Hoerlein (COL '40), professor, Department of Pathology and Bacteriology; Yahya Abdelbaki (B.V.S., Cairo University '49), instructor, Department of Anatomy; Edward L. Gillette (KSU '56), instructor, Department of Veterinary Medicine; Thomas Hawn (COL '59), instructor, Department of Surgery and Clinics; Lawrence M. Holland (COL '58), instructor, Department of Surgery and Clinics; Robert Keiss (COL '53), instructor, Department of Pathology and Bacteriology; Edward T. McKenna (KSU '59), instructor, Department of Veterinary Medicine; and Joseph A. Mollo (COL '43), instructor, Department of Pathology and Bacteriology.

DR. L. KEITH WAYT HEADS VETERINARY MEDICINE DEPARTMENT AT C.S.U.—Dr. L. Keith Wayt has been advanced to professor and head of the Department of Veterinary Medicine at Colorado State University, College of Veterinary Medicine. His appointment became effective October 1.

Dr. Wayt, who received his D.V.M. degree from Colorado State University in 1946 and an M.S. degree in 1954, joined the university's faculty in 1950 as an assistant professor. He was advanced to full professorial status earlier this year.

Dr. L. Keith Wayt

He has been doing additional graduate work at the University of Colorado since 1954, and currently is studying the effects of x-radiation on blood forming tissues of embryos, a joint project with the University's School of Medicine which is supported by the Atomic Energy Commission.

His department is responsible for teaching courses in medicine and radiology.

Georgia, University of

The following new appointments were made on the faculty of the School of Veterinary Medicine at the University of Georgia: Drs. A. M. Mills (COR '20), head, Department of Medicine and

Surgery; Norman R. Tufts (UP '46), assistant professor, Department of Microbiology and Preventive Medicine; and James Robert Duncan (GA '59), instructor, Department of Veterinary Anatomy and Histology.

DR. A. M. MILLS APPOINTED HEAD OF MEDICINE AND SURGERY.—Oct. 1, 1959, Dr. A. M. Mills was appointed professor and head of the Department of Medicine and Surgery at the School of Veterinary Medicine, University of Georgia.

Born in Durhamville, N.Y., he graduated from the Oneida high school and later attended the Morrisville Agricultural School. He graduated

Dr. A. M. Mills

from the N.Y. State Veterinary College at Cornell in 1920.

From 1920 to 1922, Dr. Mills was employed at the Parker Ranch in Hawaii and from 1922-1923, he was at Cornell (in surgery). He was with the Borden Company from 1923 to 1940, whereupon he purchased the Borden Certified Farm at Earlville, N.Y.

Dr. Mills managed the farm and a private practice until 1948, except for one year (1944) when he was acting head of the Department of Medicine at Cornell. He returned to Cornell in 1948, as professor of Surgery.

In January, 1952, Dr. Mills joined the School of Veterinary Medicine at the University of Georgia as professor of medicine and surgery.

At present, he is secretary-treasurer of the Georgia V.M.A. and editor of the *Georgia Veterinarian.*

Illinois, University of

The following additions were made to the staff of the College of Veterinary Medicine at the University of Illinois: Dr. Miodrag Ristic (HAN '50), professor, Department of Veterinary Pathology and Hygiene; Dr. George Theodore Woods (KSU '46), associate professor, Department of Microbiology and Public Health; Mr. Richard Albert Notzold (M.S., ILL), instructor, Department of Veterinary Anatomy and Histology; Mrs. Christina Garwood Barthel (B.S., ISC), assistant, Department of Veterinary Pathology and Hygiene; and Miss Marilyn Larson (A.B., Upsala College), assistant, Department of Veterinary Pathology and Hygiene.

Iowa State University

New appointments to the faculty of the College of Veterinary Medicine at Iowa State University are as follows: Drs. Burnell W. Kingrey (ISU '44), Director of Veterinary Clinics; Victor W. Bolie, (Ph.D. Electrical Engineer, ISU '52), professor of Medical Electronics, Department of Physiology and Pharmacology; Roger A. Conant (MSU '59), assistant professor, Department of Medicine and Surgery; David Gambal (Ph.D. Biochemistry, Purdue '57, assistant professor, Veterinary Medical Research Institute; Raymond L. Morter (ISU '57), assistant professor, Veterinary Medical Research Institute; Neal R. Cholvin (MSU '54), assistant professor, Department of Physiology and Pharmacology; John R. Andersen (ISU '59), instructor, Veterinary Diagnostic Laboratory; Charles E. Polk (GA '55), instructor, Veterinary Diagnostic Laboratory; and Mark F. Young (ISU '58), instructor, Department of Obstetrics and Radiology.

DR. BURNELL W. KINGREY, DIRECTOR OF VETERINARY CLINICS AT I. S. U.—Dr. Burnell W. Kingrey has succeeded Dr. M. J. Johnson (ISU '32), who retired July 1, 1959, as director of veterinary clinics, at Iowa State.

Dr. Burnell W. Kingrey

Born in Worthington, Minn., Dr. Kingrey graduated from Iowa State University in 1944 and received his M.S. degree in 1954. Dr. Kingrey was engaged in general practice at Lena, Ill., from 1944 to 1953.

He returned to Iowa State University as assistant professor in the Department of Medicine and Surgery, July 1, 1953, and was appointed professor and head of that Department July 1, 1955. He remains as head of the Department of Medicine and Surgery, along with his new duties as director of veterinary clinics.

Kansas State University

Various veterinary faculty changes at the School of Veterinary Medicine at Kansas State University are as follows: Drs. Rudolf W. Adrian (ZUR '58), instructor, Department of Anatomy; Kenneth W. Conklin (CAL '58), instructor, Department of Surgery and Medicine; George Heneveld, Jr. (MSU '50), instructor, Department of Surgery and Medicine; James S. Larsen (MSU '59), instructor, Department of Surgery and Medicine; Harry C. Mussman (Ph.D., KSU '59), instructor, Department of Pathology; Laurs S. Nilsson, Jr. (UP '52), instructor, Department of Physiology; Frederick W. Oehme (COR '58), instructor, Department of Surgery and Medicine; James D. Smith (KSU '58), instructor, Department of Surgery and Medicine; and Dan W. Upson (KSU '52), instructor, Department of Physiology.

Michigan State University

The College of Veterinary Medicine at Michigan State University included the following new personnel on its faculty for 1959-1960: Drs. C. C. Ellis (COR '31), associate professor, Department of Poultry Pathology; J. T. Bell, Jr. (GA '52), associate professor, Department of Anatomy; G. S. Bajwa (B.V.Sc. '51), instructor, Department of Poultry Pathology; J. B. Dalley (MSU '59), instructor, ambulatory clinic; Aaron Leash (MSU '58), instructor, small animal clinic; and Miss Eugenia Szpieg (B.S., Wayne University), Department of Medical Technology.

Minnesota, University of

Current additions to the faculty of the College of Veterinary Medicine at the University of Minnesota follow: Drs. Rolf H. Engebretsen (NVC '47), associate professor, Division of Veterinary Anatomy—a temporary appointment while a regular appointee is on sabbatical leave; Richard C. Herschler (MIN '56), instructor, Division of Veterinary Surgery and Radiology; Franklin A. Ahrens (KSU '59), instructor, Division of Veterinary Medicine and Clinics; Martin E. Bergeland (MIN '59), instructor, Division of Veterinary Diagnostic Laboratories; and Donald L. Sime (ISU '59), instructor, Division of Veterinary Medicine and Clinics.

Missouri, University of

Only one addition was made to the staff of the School of Veterinary Medicine at the University of Missouri during the academic year 1959-1960. He is Dr. Lloyd E. Davis (OSU '59), instructor, Department of Veterinary Physiology and Pharmacology.

Montreal, University of

The School of Veterinary Medicine, St. Hyacinthe, Que., which is affiliated with the University of Montreal, added the following personnel to its faculty: Drs. Emile Poitras (MON '36), head of clinics; Gilles Charbonneau (MON '59), clinics; Jacques Lebel, (MON '58), small animal clinics; J. Denis Mongeau (MON '56), Department of Bacteriology and Microbiology; and Jean Pierard (MON '57), assistant, Department of Pathology and Histology.

Oklahoma State University

New staff members of the College of Veterinary Medicine at Oklahoma State University are: Drs. M. C. Morrissette (KSU '54), assistant professor, Department of Veterinary Physiology and Pharmacology; T. B. Cleland (ONT '49), instructor, Department of Veterinary Parasitology; M. R. Frey (KSU '56), instructor, Department of Veterinary Anatomy; and D. D. Holmes, instructor, Department of Veterinary Pathology.

Ohio State University

One new member was added to the faculty of the College of Veterinary Medicine at Ohio State University this year. He is Dr. Sharron L. Martin (OSU '59), who is an instructor in the Department of Veterinary Medicine.

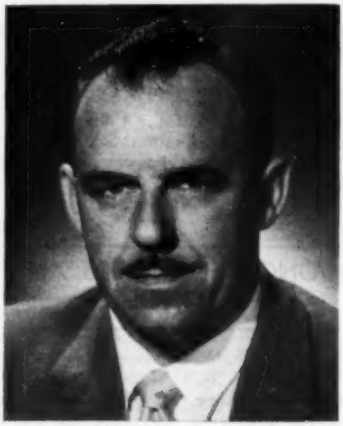
Pennsylvania, University of

Veterinary faculty changes at the School of Veterinary Medicine, University of Pennsylvania, are as follows: Drs. Martin A. Kaplan (UP '44), visiting professor of veterinary hygiene; James Murphy (UP '35), research professor of veterinary medicine; John D. Biggers (R.C.V.S. '57), adjunct associate professor of physiology; Robert Schwartzman (UP '52), assistant professor of veterinary medicine; John L. Hyde (COR '54), research associate of veterinary medicine; Olive K. Britt (GA '59), instructor in veterinary medicine; George E. Cohan (UP '41), instructor in food hygiene; Carl M. Cousins (TUS '59), instructor in veterinary medicine; Ellen J. Maxwell (GA '57), instructor in veterinary surgery; Richard Stoneback (UP), instructor in veterinary medicine; Michael Ratner (UP '59), assistant instructor in veterinary surgery.

Purdue University

Following is a list of the new appointments to the faculty of the School of Veterinary Science and Medicine at Purdue University: Dr. Calvin C. Turbes (ISU '44), associate professor; Mr. Algernon R. Allen (M.S., Med. College of Ga. '58), assistant professor; Dr. John P. Gibson (KSU '59), instructor; John H. Greve (MSU '59), instructor; and Edward J. Hinsman (MSU '58), instructor.

DR. E. O. HAELTERMAN IS ASSISTANT DEAN OF SCHOOL OF VETERINARY SCIENCE AND MEDICINE.—Dr. Edward O. Haelterman (MSU '52) has been appointed assistant dean of the School of Veterinary Science and Medicine at Purdue University.



Dr. Edward O. Haelterman

In addition to his D.V.M. degree from MSU, Dr. Haelterman also received a M.S. degree in 1955, and a Ph.D. degree in 1959, from there.

He has been at Purdue since his graduation in 1952. Dr. Haelterman is the author of numerous publications dealing with diseases in swine. He holds membership in the AVMA, Phi Kappa Phi, Phi Zeta, and Sigma Xi.

DR. J. F. BULLARD APPOINTED PROFESSOR AND HEAD OF VETERINARY CLINICS.—A 1922 graduate of Cornell University, Dr. John F. Bullard, newly appointed professor and head of the Department of Veterinary Clinics at Purdue, also has a M.S. degree from Kansas State University (1930). In addition, he has taken special graduate work at the University of Michigan.

His previous experience included: a general practice in Walton, N.Y. (1922-1923); instructor in the Department of Surgery and Medicine at Kansas State University (1923-1926); at the University of Kentucky, research in equine diseases (1926-1927); contract veterinarian, Lexington, Ky.

Dr. John F. Bullard

(1927-1928); and finally Purdue (February, 1929).

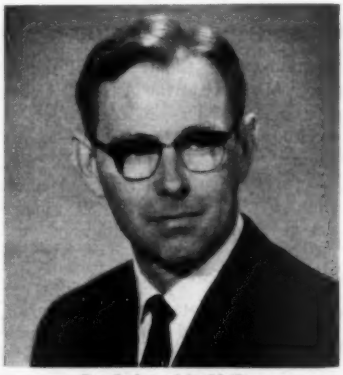
Dr. Bullard is the author of numerous publications, mostly in relation to the clinical aspects of veterinary medicine.

He is a member of the AVMA, Sigma Xi, and of the Research Workers in Animal Diseases.

DR. R. M. CLAFLIN—NEW HEAD OF VETERINARY MICROBIOLOGY, PATHOLOGY, AND P.H.—Dr. Robert M. Claflin (MSU '52) has been appointed professor and head of the Department of Veterinary Microbiology, Pathology, and Public Health at Purdue.

In addition to his degree in veterinary medicine from Michigan State, Dr. Claflin also received a M.S. degree in 1956, and a Ph.D. degree in 1958, from Purdue University.

He came to Purdue in 1952. An author of numerous publications dealing with infectious diseases in swine and mucosal diseases of cattle, Dr. Claflin is also a member of the AVMA, Phi Zeta, and Phi Kappa Phi.



Dr. Robert M. Claflin

DR. G. D. GOETSCH HEADS DEPARTMENT OF VETERINARY PHYSIOLOGY AND PHARMACOLOGY.—Dr. Gerald D. Goetsch (KSU '45) has been appointed professor and head of the Department of Veterinary Physiology and Pharmacology at Purdue.

Dr. Gerald D. Goetsch

Dr. Goetsch has an M.S. degree (1955) and a Ph.D. degree (1957) from Purdue University. He was engaged in private practice in Kankakee, Ill., for two years; was an assistant professor of veterinary physiology at the University of Missouri for a year and at Oklahoma A. & M. University for four years, before coming to Purdue University as an instructor in 1952.

Dr. Goetsch has written largely in the field of metabolic diseases of sheep. He is a member of Sigma Xi, the American Association of Veterinary Physiologists and Pharmacologists, and of the Research Workers in Animal Diseases.

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Texas, A. & M. College of

New appointments to the faculty of the School of Veterinary Medicine at the A. & M. College of Texas are as follows: Drs. A. G. Kemler, (KSU '50), associate professor, Department of Veterinary Anatomy; G. M. Gowing, (TEX '59), instructor, Department of Veterinary Medicine & Surgery; and F. A. Fear (TEX '59), instructor, Department of Veterinary Pathology.

Toronto, University of

Appointments to the staff of the Ontario Veterinary College (affiliated with the University of Toronto) during the past year include: Drs. P. K. Basrur (Ph.D.), assistant professor, Department of Anatomy and Histology; C. P. P. FitzGerald (DUB '43), assistant professor, Department of Pathology and Bacteriology; K. A. McEwen (ONT '51), assistant professor, Extension; W. J. B. Ditchfield (ONT '56), lecturer, Extension; V. Zavitz (ONT '57), lecturer, Department of Anatomy and Histology; and Mr. A. S. Szekely (B.Sc., B.A.), assistant, Department of Anatomy and Histology.

Tuskegee Institute

Newly appointed veterinarians on the staff of the School of Veterinary Medicine at Tuskegee Institute are: Drs. Francis L. Bias (TUS '59), instructor, Large Animal Clinic; Albert W. Dade (TUS '59), instructor, Department of Pathology and Parasitology; Norman L. Gorrell (TUS '59), instructor, Department of Bacteriology and Public Health; and Charles N. Saunders (TUS '59), instructor, small animal clinic.

Washington State University

Added to the faculty of the College of Veterinary Medicine at Washington State University, was Dr. Orville L. Frost who was made an assistant professor in the Department of Veterinary Clinical Medicine.

AMONG THE STATES AND PROVINCES

California

Women's Auxiliary to State Association Meets.—The Women's Auxiliary to the California State V.M.A. held its summer convention at the Miramar Hotel in Santa Monica, in June, 1959.

Dr. Donald Jasper, dean of the School of Veterinary Medicine at the University of California, presided over the installation ceremonies of the Auxiliary's new officers as follows: Mrs. Ben S. Burdo, Sebastopol, president; Mrs. Russell P. Cope, Richmond, president-elect; Mrs. Donald Jasper, Davis, first vice-president; Mrs. Louis Johnson, Sacramento, second vice-president; Mrs. William Putney, Van Nuys, membership secretary; Mrs. Harold Snow, Los Angeles, secretary; Mrs. Ronald Hauge, Sacramento, treasurer; and Mrs. Herbert Ott, Norwalk, parliamentarian.

Mrs. Burdo announced the 1960 nominating committee to be: Mrs. E. R. Braun, Hanford, chairman; Mrs. H. F. Blanchard, San Jose; and Mrs. Philip Olson, Los Angeles.

Donations to the Student Loan Fund, from the local auxiliaries, were announced as follows: Southern California ($50); Alameda-Contra Costa ($100); Sacramento Valley ($50, plus an anonymous check for $50); and San Diego ($25).

Mrs. Reginald Stocking, past president of the Women's Auxiliary to the Calif. V.M.A., presents the gavel to the 1959-60 president, Mrs. Ben S. Burdo.

Other new officers pictured, include: left to right—Mrs. H. I. Ott, parliamentarian; Mrs. William Putney, membership secretary; Mrs. Ronald T. Hauge, treasurer; Mrs. Russell P. Cope, president-elect; Mrs. Louis V. Johnson, second vice-president; Mrs. Harold Snow, secretary.

Eight past presidents were honored at the Auxiliary's luncheon, at the Miramar Hotel. These included: Mrs. E. V. Bacon (1938-1939); Mrs. Leslie Pike (1946-1947); Mrs. Marjorie Hatch (1948-1949); Mrs. G. N. Miller (1949-1950); Mrs. H. I. Ott (1951-1952); Mrs. Thomas Eville (1954-1955); Mrs. R. E. Duckworth (1956-1957); and Mrs. Charles Ozanian (1957-1958). In addition, Mrs. Burdo presented Mrs. Stocking with a gift from the Auxiliary for her exemplary leadership during 1958-1959.

s/MRS. DONALD E. JASPER, *First Vice-President.*

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Midwinter Conference.—The midwinter conference of the California V.M.A. will be held at the School of Veterinary Medicine, University of California, in Davis, Feb. 1—3, 1960.

Outstanding speakers on the program will be: Drs. Raymond Reed, University of Arizona; Rue Jensen, dean, Colorado State University; E. E. Stuart, Decatur, Ala.; Mogens Simesen, visiting professor from Copenhagen; Werner Heuschele, San Diego Zoo; Seymour Roberts, Richmond, Calif.; George R. Burch, Pitman-Moore Co., Indianapolis, Ind.; as well as several veterinarians from the School of Veterinary Medicine at the University of California.

Papers will be presented on eye diseases in the dog, bloat in cattle, liver biopsy in cattle, veterinary problems in atomic fallout, and newer developments in veterinary medicine. In addition, a program of closed-circuit television is planned.

Dr. R. L. Collinson, second vice-president of the California V.M.A., is overall program chairman.

Kansas

Two K. S. U. Seniors Awarded Fribourg Scholarships.—On September 24, two Kansas State University seniors were announced winners of $500 Fribourg Foundation Scholarships for the 1959-1960 school year.

They are: Charles Eck, Bismarck, N. Dak., who is a senior in veterinary medicine; and Earl Beck, Horton, Kan., a senior in agricultural education.

Fribourg scholarships, established by the Continental Grain Company of Chicago through the Kansas State Endowment Association, go to students who have attained high academic achievement in the study of agriculture or a related field and who need financial assistance. Mr. Eck has earned a 3.4 grade point average and Mr. Beck 3.71.

Mr. Eck is a member of the Student Chapter of the AVMA. During vacations he has worked as a brucellosis technician for the North Dakota Livestock Sanitary Board and as an assistant in the University's veterinary hospital.

Missouri

University and State Association Hold Conference.—The 35th annual conference for graduate veterinarians was held at the University of Missouri, November 2-3. It was co-sponsored by the School of Veterinary Medicine, University of Missouri and the Missouri V.M.A.

Among those featured on the program were: Drs. D. L. Proctor, Jr., Lexington, Ky; L. E. Boley, University of Illinois; L. A. Rosner, Missouri's state veterinarian; Dean A. H. Groth, School of Veterinary Medicine, University of Missouri; and W. H. Mowder, Independence, Mo., president of the state association.

Special features included a closed-circuit television program, showing clinical and laboratory demonstrations, and a banquet in the Memorial Student Union Building on the University campus.

Ohio

Mahoning County Association Elects New Roster.—At a recent meeting of the Mahoning

County V.M.A., the following new officers were chosen: Drs. Sam Segall, Youngstown, president; Wilbur Crago, Poland, vice-president; and Robert Edwards, Youngstown, secretary-treasurer.

s/SAM SEGALL, *President.*

Pennsylvania

Diamond Anniversary Celebration Held at U.P.—The University of Pennsylvania held a special convocation to commemorate the 75th anniversary of the founding of the School of Veterinary Medicine, on Oct. 3, 1959, at Irvine Auditorium, in Philadelphia. The convocation was scheduled to coincide with the 77th annual convention of the Pennsylvania State V.M.A.'s meeting.

Three Scientists Honored

Dr. Gaylord P. Harnwell, president of the University, presented honorary Doctor of Science degrees to three distinguished scientists who have made major contributions in the field of comparative medicine. They are: Dr. Richard Edwin Shope, Dr. Karl Friedrich Meyer, and Dr. Hadleigh Marsh.

A member of the Rockefeller Institute, Dr. Shope is considered to be one of the leading authorities in the field of comparative medicine.

Three distinguished scientists received honorary degrees at the Diamond Jubilee Convocation of the University of Pennsylvania's School of Veterinary Medicine, Oct. 3, 1959. Left to right—Dr. Gaylord P. Harnwell, president of the University, presents honorary doctor of science degrees to: Drs. Richard E. Shope, Karl Friedrich Meyer, and Hadleigh Marsh.

He has concentrated his research on the nature and actions of viruses in animals and man.

His research contributions include studies of a type of influenza which attacks deer, significant work in hog cholera, and the development of the Shope papilloma, an infectious tumor of rabbits. Dr. Shope has served as an associate trustee of the University of Pennsylvania and as a member of the Board of Medical Education and Research. He received his M. D. degree from the State University of Iowa, College of Medicine, in 1924.

A former member of the University of Pennsylvania School of Veterinary Medicine faculty, Dr. Meyer (ZUR '08), now retired, served from 1926 to 1951 as director of the University of California's Hooper Research Foundation. A veterinary virologist, his principal area of research interest has included infectious diseases of farm animals, forage poisoning in horses, botulism, equine encephalomyelitis, and brucellosis.

Dr. Hadleigh Marsh (GWU '12) is a veterinary pathologist on the faculty of Montana State College. Most of his professional life has been devoted to research on diseases of food-producing animals; he is recognized world-wide as an authority on diseases of sheep and beef cattle and on plants poisonous to livestock.

He is a consultant to the U. S. Department of Agriculture and has received a number of awards for his achievements, including the XIIth International Veterinary Congress prize for outstanding service to veterinary science awarded by the AVMA (1956).

Plaque Presented to School

Colonel Samuel P. Wetherill, president of the Philadelphia society for promoting agriculture, presented a plaque in commemoration of the School of Veterinary Medicine's 75th aniversary. Dr. I. S. Ravdin, vice-president for medical development, accepted the plaque in behalf of the University. The Philadelphia society for promoting agriculture played a major role in formation of the School in 1884.

Speakers for the special convocation included Dr. Shope, who spoke on "Comparative Medicine," and Dr. Ravdin, whose subject was "Veterinary Medicine."

Founded on Oct. 2, 1884, the School, (second oldest in the United States) also has the distinction of being the only veterinary school in the United States that is intimately associated with a medical school and medical center instead of an agricultural school.

• • •

Keystone Association.—The regular meeting of the Keystone V.M.A. was held on Oct. 28, 1959, in the new students' lounge at the University of Pennsylvania, School of Veterinary Medicine.

Speaker for the evening was Dr. John Hale of the University Hospital, Department of Radiology, who presented a talk entitled "Factors in Making and Taking a Roentgenogram."

Newly installed officers of the Association are as follows: Drs. M. Gradess, Jenkintown, president; S. Holtman, Philadelphia, vice-presi-

dent; R. Snyder, Upper Darby, corresponding secretary; and J. Kolodner, Philadelphia, recording secretary-treasurer.

s/J. L. KOLODNER, *Recording Secretary.*

• • •

Dr. Ravdin Elected Vice-President for Medical Affairs at U.P.—Dr. I. S. Ravdin, professor or surgery in the School of Medicine at the University of Pennsylvania, was recently elected vice-president for medical affairs at the University.

In this capacity, he will be responsible for directing the administration and academic affairs of the medical division composed of the schools of medicine, graduate medicine, dentistry, veterinary medicine, nursing, and allied medical professions.

Dr. Ravdin was elected to honorary AVMA membership at the Association's annual meeting in Kansas City last August.

Quebec

Current Enrollment at Saint Hyacinthe.—For 1959-1960, the School of Veterinary Medicine, University of Montreal, in Saint Hyacinthe, has a total registration of 150 students.

A maximum of 45 applicants for preveterinary classes and 35 freshmen were accepted. Seniors number 28. One hundred and twenty-seven students are from Quebec; leaving 23 students from areas outside the Province.

Due to lack of space, a great number of candidates had to be refused admittance—even though they had the required qualifications.

s/JACQUES SAINT-GEORGE, *Correspondent.*

Texas

Colonel Stevenson Is Honored.—Colonel Daniel S. Stevenson (COR '34), director, Department of Veterinary Science at the Army Medical Service School, recently received a certificate of achievement for outstanding service from July, 1957, to September, 1959, in a ceremony at Brooke Army Medical Center, in Fort Sam Houston, Texas.

The citation, signed by Major General Elbert DeCoursey, retiring School commandant, read in part, "Colonel Stevenson demonstrated unusual devotion to duty, intense personal interest, and tireless effort. . . His keen technical insight and conscientious devotion to duty have done much to deserve many of the accolades . . . bestowed upon the Army Medical Service School for the outstanding instruction presented."

Colonel Stevenson entered the Army in 1934.

Virginia

Southwest Association Holds Election.—The Southwest Virginia V.M.A. met on October 1, and elected a new roster as follows: Drs. L. N. Springer, Dublin, president; E. E. Thompson, Salem, vice-president; and D. F. Watson, Blacksburg, secretary-treasurer.

The following program committee was also appointed: Drs. W. R. Van Dresser, Blacksburg; A. W. Rice, Roanoke; and J. R. Fenyk, Marion.

The election of officers was followed by an illustrated talk on veterinary practice in New Zealand by Dr. M. Alejandro Ramirez (SM '48), Taumarunui, New Zealand.

s/D. F. WATSON, *Secretary.*

FOREIGN NEWS

Geneva, Switzerland

Second Conference on Milk Hygiene Held.—The joint FAO/WHO Expert Committee on Milk Hygiene held its second session in Geneva, Switzerland, July 13-18, 1959, and reviewed the advances made in the production and distribution of fluid and dried milks since 1956, when the report of the group's first session was made. In addition, the committee gave special attention to the milk hygiene problems in warm-weather countries, especially in those with a low technical development.

In the light of new knowledge and scientific improvements, the committee decided that certain modifications of the first report would be necessary. Thus, the two reports should be read in conjunction with each other. One point in the initial report which has led to some confusion is the term, "sterilized milk," to designate a product which has been heat-treated to a higher degree than pasteurization which has good-keeping qualities even though not refrigerated.

The committee considered that this process should be called *intensive heat treatment* and that the terms, "sterile milk" or "sterilized milk," should be applied only when the milk in its final container is truly sterile in the microbiological sense, i.e., when it is free from all living microorganisms. Theoretically such milk should remain fit for consumption for an indefinite period of time, provided the container remains air-tight and no objectionable chemical changes take place.

The committee considered the hygiene of cheese, butter, fermented milk products, ice cream, and certain other milk products—including reconstituted dried milk, flavored milks, condensed and evaporated milks, and butter oil. They also dealt with problems of waste water disposal and with water supply.

DEATHS

Star indicates member of AVMA

P. L. Cady (KCV '10), 76, Arlington, Neb., died in a Fremont, Neb., hospital on Sept. 18, 1959.

Dr. Cady was a former president of the Nebraska, Interstate, and Missouri Valley veterinary medical associations. In addition, he served in the AVMA's House of Representatives for two terms. He was also a former city councilman, Arlington's mayor for two terms, and a state senator from 1934 to 1935.

Among Dr. Cady's survivors are two sons who are also veterinarians: Duane (KSC '34) of El Paso, Texas; and John D. (KSC '42) of Arlington.

Robert M. Cory (USC '07), 76, Takoma Park, Md., died Sept. 7, 1959. He had been in ill health for several years, following a stroke.

Having practiced in Washington, D.C., and in Baltimore, Dr. Cory was living with a son, Azro J. Cory, 7303 Piney Branch Rd., at the time of his death. He had retired in the mid 1940's, after a 40-year career in the profession.

John F. Gillispie (ONT '96), 83, Tuscola, Ill., died in a hospital in Danville.

He was born in Dana, Ind., and moved to Tuscola in 1905. Dr. Gillispie was a veteran of the Spanish-American War.

Harry M. Hutchinson, 82, Tulsa, Okla., died Sept. 25, 1959.

Born in Belleville, Ill., Dr. Hutchinson moved to Tulsa from Kiowa, Colo. He became the city's official weather observer in 1907 and continued in this gratuitous capacity until the government took over in 1931. He read the river gauge, however, until 1955. In 1949, he was awarded a bronze pin from the U.S. Weather Bureau for his 40 years of service.

Josephine Lowry (MSU '37), Jonesville, Mich., died Oct. 12, 1958, of cancer.

Dr. Lowry had practiced small animal medicine at the Hillsdale Veterinary Hospital for the last eight years. She enjoyed the distinction of being the second woman veterinarian to graduate from Michigan State University. In addition, the year following her graduation, she became the first full-time assistant to Dr. Edward Sales (MSU '16) in the Small Animal Clinic there.

Neils Nielsen (CHI '15), 66, Center, Colo., died Sept. 22, 1959, in Monte Vista, Colo., following an extended illness.

Dr. Nielsen was a former Hooppole, Ill., resident.

George F. Punteney (KCV '06), 77, Mayette, Kan., died Aug. 30, 1959, at the home of his sister, Mrs. Neil Judd, 335 N. 16th, where he and his wife had been residing for three months prior to his death. He had been undergoing medical treatment at the University of Kansas Medical Center.

After his retirement from veterinary medicine, Dr. Punteney had been engaged in farming.

★**Lawrence H. Taylor** (UP '50), 35, Oxford, Pa., died June 28, 1959, due to a brain tumor. He had been in ill health several months.

A member of the faculty of the School of Veterinary Medicine (instructor-preceptor) of the University of Pennsylvania, he had also practiced in Oxford since 1950. A life-long resident of Chester County, he attended the Oxford High School and obtained his preveterinary training at Pennsylvania State University. During World War II, Dr. Taylor served with the U.S. Air Force.

★**Amos A. Turner** (IND '23), 64, Mesa, Ariz. died July 28, 1959, following a heart attack.

Born in Fairfield, Ill., Dr. Turner had served in World War I. He had spent eight years with the U.S. Bureau of Animal Industry as a federal meat inspector in both New York City and Baltimore, Md. In 1937, he began his practice in Freeport, Ill.

In 1954, Dr. and Mrs. Turner moved to Arizona, where he was associated with Kindness Animal Hospital in Phoenix, until his retirement last January.

Dr. Turner was a former president of the Northern Illinois V.M.A. In addition, he had served on the executive board of the Illinois State V.M.A.

★**Olin G. Wheaton** (ISC '21), 65, Naperville, Ill., died Sept. 26, 1959. Although illness in recent years had curtailed his professional activities, he served Du Page County area professionally for 36 years.

Dr. Wheaton had interrupted his college career to join the U.S. Navy during World War I and, at one time, he had been commander of the American Legion Post No. 43 in Naperville for three years.

Dr. Wheaton was a native of St. Charles, Ill.

• • •

Other Deaths Reported. — The following deaths have been reported. Information for an obituary was not supplied.

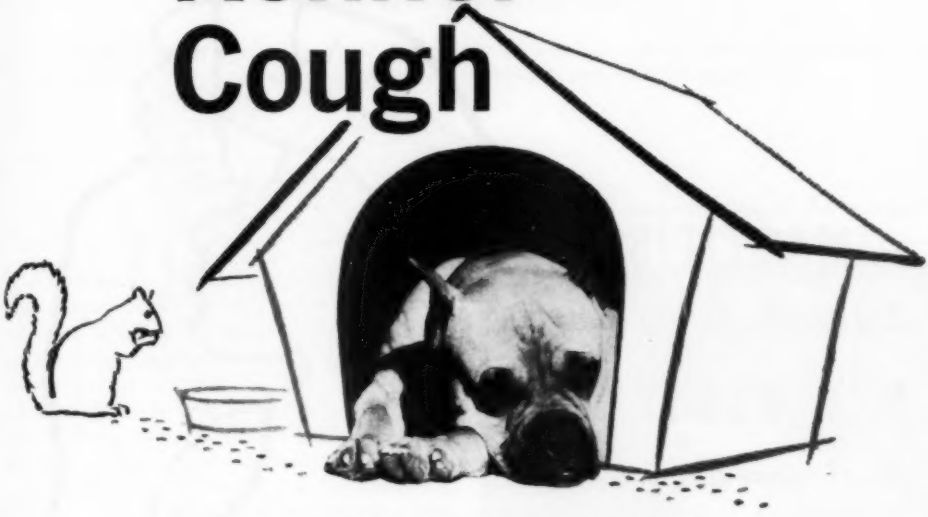
James A. Benner (UP '04), South Bethlehem, Pa., died June 11, 1959.

Clyde S. Hess, 84, Wolf Lake, Mich., formerly of Wabash, Ind., died Sept. 11, 1959.

Lester T. Hite, Sr., 73, Leesville, S. Car., died Aug. 29, 1959.

C. F. Pauly (MCK '18), 70, Kirkwood, Ill., died Sept. 12, 1959.

Kennel Cough



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dry and lactating cows

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single-dose dispenser for

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brand of nitrofurazone

- delivers one full dose
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- unique package

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FURACIN has been shown to be strikingly effective in controlling mastitis under field conditions.[1,2] Of 7,123 lactating cows with acute mastitis, fair to excellent results were obtained in 5,597 (78%). Of 3,418 dry cows which had had mastitis during their previous lactating period, fair to excellent results were obtained in 3,104 (90%).

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1. Mires, M. H., and Chadwick, R. H.: Vet. News **10**:3 (Jan.-Feb.) 1947. 2. Mires, M. H.: J. Am. Vet. M. Ass. **117**:49 (July) 1950.

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What Is Your Diagnosis?

Because of the interest in veterinary radiology, a case history and radiographs depicting a diagnostic problem are usually published in each issue.

Make your diagnosis from the picture below—then turn the page ▸

History.—A male mongrel dog, 13 years old, was listless and had not eaten for several days. When vomition occurred, the owner thought the dog was "poisoned" and brought it in for examination. The urinary bladder was greatly distended and urine occasionally dripped from the penis. A catheter, when passed through the urethra, encountered an obstruction at the posterior end of the os penis. A radiograph was taken.

This report was submitted by Joseph H. Lorber, D.V.M., Lafayette, Calif.

Our readers are invited to submit histories, radiographs, and diagnoses of interesting cases which are suitable for publication.

Here Is the Diagnosis

(Continued from preceding page)

Diagnosis.—Urolithiasis in the urethra.

Comment.—The radiograph is interesting because of the position of six calculi in the urethra (fig. 1). The dog, although allowed to roam, was not known to have had previous urinary blockage. A ventrodorsal radiograph failed to show further stones in the bladder. It is difficult to imagine the circumstance under which all six stones would enter the urethra at one time, leaving none in the bladder, or why the calculi had not caused trouble previously since, because of their size, they must have been present for some time.

Fig. 2—Radiograph of pelvis, lateral view, showing calculi (A) in urethra at end of os penis.

APPLICATIONS

Applicants Not Members of Constituent Associations

In accordance with paragraph (c) of Section 1, Article I, of the Bylaws, the names of applicants who are not members of constituent associations shall be published in the JOURNAL. Written comments received by the Executive Secretary from any active member regarding the application as published, will be furnished to the Judicial Council for its consideration prior to acceptance of the application.

BELTRI, ENRIQUE
Av. Cuauhtooc, No. 981, Mexico D. F. 12, Mexico.
M.V.Z., Esuela de Medicina Veterinaria de la Universidad Autonoma de Mexico, 1956.
Vouchers: Alfonso Alexander H. and Daniel Mercado G.

STRANDBERG, HAROLD L.
USAREUR Medical Laboratory, APO 180, N. Y., N. Y.
D.V.M., University of Minnesota, 1959.
Vouchers: C. W. Betzold and F. C. Votaw

KUHN, GEORGE A.
USCAR, APO 331, San Francisco, Calif.
D.V.M., Washington State College, 1930.
Vouchers: W. E. Jennings and G. H. Zacherle, Jr.

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in bacterial infections of the eye and ear, operative wounds, burns

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dressing veterinary with anesthetic

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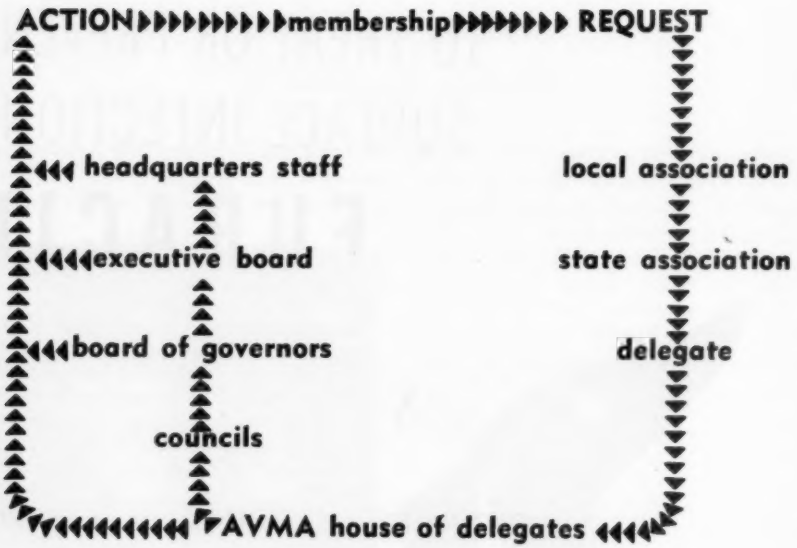


Responsibilities of Various AVMA Councils

The Judicial Council

The Judicial Council shall be the judicial branch of the Association and shall:

1) Consider all matters involving the admission, expulsion, or dismissal of members as provided in Article I of these Bylaws, and all controversies arising under the Constitution, Bylaws, or the Principles of Veterinary Medical Ethics to which the Association is a party.

2) Have jurisdiction on all questions of veterinary medical ethics and the interpretation of the Constitution, Bylaws, and rules of the Association.

3) Investigate general professional conditions and all matters pertaining to the relations of veterinarians to one another or to the public, and make such recommendations to the House of Delegates or the constituent associations as it deems necessary.

4) Have authority to request the president to appoint investigating juries to which it shall refer complaints or evidence of unethical conduct which in its judgment are of a serious and substantial nature. Such investigating juries, if probable cause for action be shown, shall submit formal charges to the president, who shall appoint a prosecutor to prosecute such charges against the accused before the Judicial Council in the name and on behalf of the Association. The Council may acquit, admonish, suspend, or expel the accused from the Association.

Council on Education

The Council shall:

1) Outline the means and methods for the progressive improvement of veterinary medical education in all its aspects.

2) Establish criteria for essentials of an acceptable school or college which offers courses leading to a degree in veterinary medicine, including admission requirements, undergraduate curriculum, research programs, and graduate training.

3) Determine and publish periodically the accreditation status of the various schools and colleges giving degrees in veterinary medicine.

4) Establish standards of proficiency by correlating all the activities associated with veterinary medical education.

5) Study methods of teaching in veterinary medical schools and colleges.

6) Support and encourage the efforts of the veterinary medical schools and colleges to attract qualified personnel to teach veterinary medicine.

7) Study the needs for establishing courses that will enable veterinarians to meet changing developments in the field of veterinary medicine.

Council on Research

The Council shall:

1) Serve as a coordinating and correlating body in matters pertaining to veterinary research coming under its jurisdiction.

2) Develop plans and projects based on the establishment of fellowships with any funds that may be provided for the purpose of encouraging graduate and postgraduate study by veterinarians and developing more and better veterinary investigators, teachers, and practitioners.

3) With any funds that may be provided, assign projects for research on specific problems, determine the conditions, and indicate the facilities required for such projects.

4) Evaluate manuscripts submitted either for publication in the *American Journal of Veterinary Research* or for any purpose by the editor-in-chief.

Council on Veterinary Service

The Council shall:

1) Make available facts, data, and opinions with respect to timely and adequate rendition of veterinary service to the public.

2) Study and suggest means for the distribution of veterinary service to the public consistent with the principles adopted by the House of Delegates.

3) Investigate matters pertaining to the economic and social aspects of veterinary service.

4) Develop and assist committees of the constituent associations on veterinary service.

Council on Biological and Therapeutic Agents

The Council shall:

1) Study the prophylactic and therapeutic merits of the various biological products employed in the practice of veterinary medicine.

2) Study the merits of proprietary pharmaceutical preparations employed in the practice of veterinary medicine.

3) Cooperate with the Food and Drug Administration of the federal Department of Health, Education, and Welfare and the Agricultural Research Service of the U.S. Department of Agriculture in removing undesirable products from the drug and food markets.

4) Cooperate with other groups in the medical profession engaged in similar activities.

5) Advise the advertising manager of the JOURNAL as to the acceptability of advertising pertaining to biological and therapeutic agents.

Council on Public Health and Regulatory Veterinary Medicine

The Council shall:

1) Give continuous study to problems of production, processing, and distribution of foods of animal origin as they relate to the assurance of an adequate supply of such food that is clean, sound, wholesome, and free from adulteration.

2) Recommend and encourage programs which will assure proper participation by veterinarians in protecting consumer interest and will contribute to a continued market for livestock and livestock products.

3) Receive, collect, and dispense information on diseases of animals transmissible to man.

4) Encourage greater participation by veterinarians in the field of preventive veterinary medicine as it relates to public health and agriculture.

AVMA Research Fellowships Available

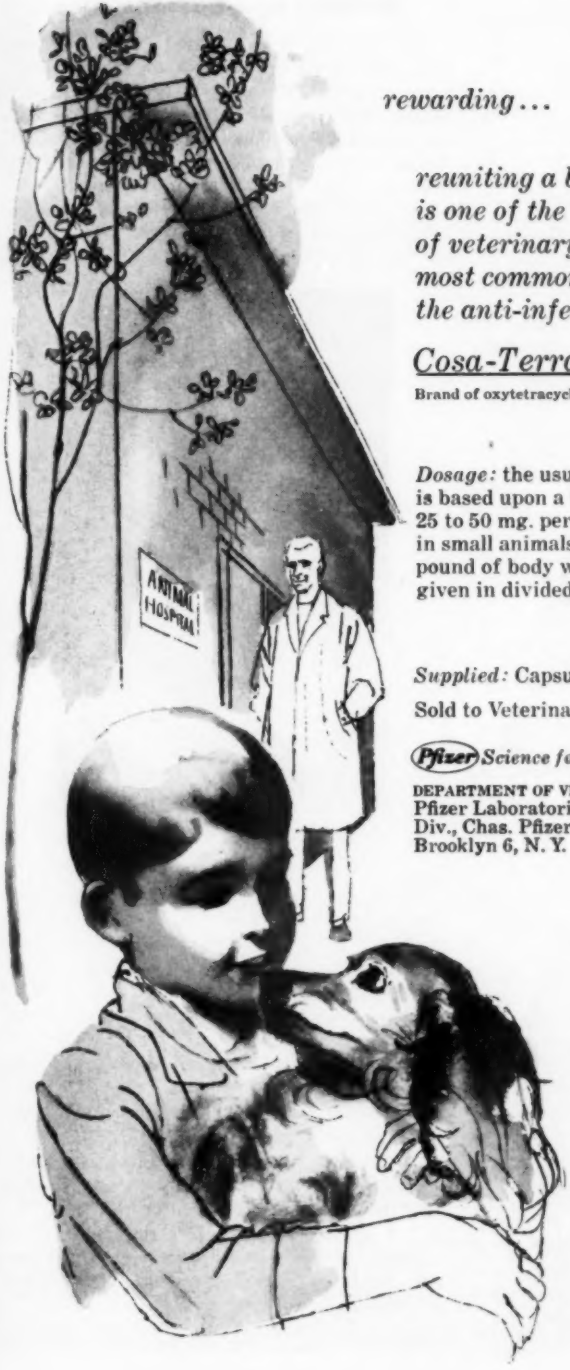
The Council on Research of the AVMA announces the availability of a number of fellowships for postgraduate training for the academic year, 1960-1961.

The recipient of a fellowship must be a veterinarian and a citizen of the United States or Canada. Veterinary students who expect to graduate at the end of the current school year and who wish to follow a career in research may apply for a fellowship.

The latest date for filing the completed application is Feb. 15, 1960. Approximately one month is required for processing completed applications after receipt by the secretary of the Council. Qualified persons should secure and submit applications as early as possible to insure their file being complete for presentation to the Committee on Fellowships.

The Committee on Fellowships of the Council on Research will meet in March to consider applications, and the awards will be announced soon afterward. The stipend will be determined in each case by the needs of the individual, the location of the school in which he proposes to work, and other factors. In general, the stipends range from $100 monthly and upward.

Any qualified person interested in graduate training may obtain application blanks and other information by writing to Secretary, AVMA Council on Research, 600 S. Michigan Ave., Chicago 5, Ill.



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Women's Auxiliary

1960 New Year's Resolutions

Women's Auxiliary to the AVMA

Be it resolved:

1) That more loans will be made available to veterinary students through increased contributions to the Student Loan Fund.

2) That membership will be increased, a new member for every present member.

3) That more information about auxiliaries and members will be provided through the Auxiliary pages of the JOURNAL of the AVMA and the *Auxiliary News.*

4) That auxiliary members will be better informed about the position of the veterinary profession in our society today, the progress in research, advanced education, practice and improved professional and public relations.

5) That close relationship will be maintained between the student auxiliaries and the parent organization, in addition to the complimentary memberships given to wives of all graduating senior veterinary students.

6) That the Auxiliary will endeavor to promote interest in veterinary research as well as financial contributions to the AVMA research fund.

State or Provincial, Regional and Student Auxiliaries

Be it resolved:

1) That better fellowship among members will be actively encouraged, as it is one of the prime objectives of all veterinary auxiliaries.

2) That membership on all levels of the Auxiliary—student, regional, state or provincial, and national, is vital to the growth and progress of all.

3) That 100 per cent qualification for the Honor Roll will be the goal of each Auxiliary.

4) That more effort will be made to support the AVMA public relations program; newspaper clippings sent each month.

Individual Member

1) I hereby resolve to be a good auxiliary member, attend all meetings, take an active part, assume responsibility, serve on committees and in office; not worry about what I can "Get Out" of the auxiliary but how much I can "Give".

2) I hereby resolve to let the world know how proud I am to be the wife of a veterinarian.

(MRS. FRANK R.) LEONORE MITCHELL BOOTH
President

Projects and Personalities

Mrs. Merrill Dean (Jannis) Snook of Deer Park, Wash., typifies many of the talented wives of veterinarians. Representing her state as "Mrs. Washington" in the 1959 "Mrs. America" contest, she competed with contestants from every state in the union. She planned menus, decorated a child's bedroom, baked bread, set an attractive table with a tablecloth she had dyed, concocted original salads, and even designed hair styles.

Mrs. Merrill Dean Snook

Finals for the "Mrs. America" contest were held in Fort Lauderdale, Fla., where Mrs. Snook posed for pictures and participated in the homemaking events while her husband vacationed and relaxed. She was named the final winner in the menu planning event, but lost the "Mrs. America" title to an Iowa housewife.

Bachelor of Science degrees in home economics and education from Washington State University provided the educational background for Mrs. Snook's homemaking achievements.

The Snooks are the parents of three children: Michael Dean, six; Meleah, four; and Douglas Roy, two. They include membership in the local P.T.A. and several responsible positions in church activities among their many community activities. Dr. Snook, a general practitioner, is a member of the Deer Park City Council.

(MRS. AKIN M.) NANNETTE SIMPSON,
Editor

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You can buy them through the Payroll Savings Plan at work; you can buy them where you bank. Either way, your U.S. Savings Bonds help build a more secure future for you, your family, and your country. And now they're better than ever!

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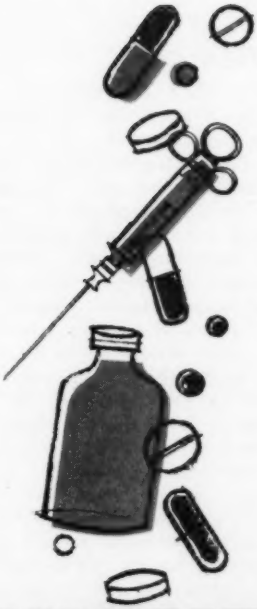

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History of the AVMA

1876

In addition to the regular meetings for 1876 in Boston and New York, a special meeting was called in April at Springfield, Mass., where an effort was made to prepare a veterinary exhibit for the Centennial Exposition to be held in Philadelphia. Nothing, however, seems to have come of this, but there was an exhibit on "farriery," sponsorship uncertain, at the Exposition. This, as the term should imply, consisted largely of an exhibit of horseshoes and the instruments used by farriers, together with examples of pathological conditions, primarily of the feet and limbs.*

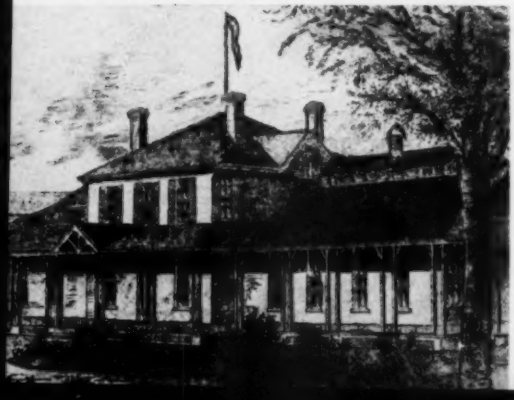
At the annual meeting held at the American Veterinary College, Henri Bouley of France, and George Fleming of England, were elected to honorary membership, the first foreign veterinarians to be accorded this honor. The officers of the previous year were re-elected.

It was resolved that a journal be printed semiannually by the Association, to be called the *American Veterinary Review*, with Drs. Liautard and Lockhart as editors. It was to cost members fifty cents per volume, the deficit to be made up from Association funds.

The meeting was adjourned to meet at the Continental Hotel in Philadelphia ten days later, where papers were presented on the "History and Progress of Veterinary Medicine," by A. Liautard; "Zymotic Diseases, and the Duties of the Veterinary Surgeon," by James Law; "The Effects of Stimulants in Disease," by A. A. Holcombe; "Sanitary Measures in Preventing Diseases in the United States and Canada," by D. M. McEachran; "Chronic Lameness in Horses," by T. S. Very; and "Fistula," by E. T. Thayer. This cross-section of veterinary thought of the time was printed in the first issue of the *Review*.

*Apparently both the Army and Agriculture Departments had such exhibits.

Army Medical Department Building at 1876 Centennial Expedition. In contrast, the only veterinary exhibits were a few pathological specimens of horses' feet.



"LIAUTARD'S HISTORY," a paper of 14 pages, is of particular interest as the first significant contribution to American veterinary history. Concerning the exhibits at the Centennial Exposition, he regretfully notes: ". . . . in this great show of the new world, where everything is represented, where every science, art and trade has its place, Veterinary Medicine alone is absent. No matter if it prevents diseases, restores health, improves breeds of animals, regulates sanitary measures, protects trade of animals: no matter, if this immense fortune of $1,600,000,000 owes much of its existence to veterinary art, to comparative medicine, in our Centennial buildings, in our exhibition, there is nothing pertaining to it."

In presenting his history of the profession in America, Liautard expresses the lament of veterinary historians since: "the lack of documents or records to be looked into." But, "I have carefully looked into periodicals, agricultural, scientific and even sporting papers . . . that I [might] lay the foundation for a better history, to be written when our profession will occupy amongst Americans the place where it ought to be—*second to none*."

Dr. Liautard begins with a cursory survey of veterinary matters in America to about 1850, and follows this with a rather detailed account of the beginnings of veterinary education in this country. His account of the Dunbar incident in Congress relative to the shoeing of Army horses (see JOURNAL, Sept. 15, 1959) gives considerably more details of this interesting and—in retrospect—amusing incident in our history.

Of considerable interest is his detailed account of the efforts in 1870 of A. W. Stein, M.D., Professor of Physiology at the N.Y. College of Veterinary Surgeons, to secure recognition of the veterinary profession by the American Medical Association. After much discussion, a resolution was adopted by the A.M.A. calling for its influence to be used in the establishment of veterinary schools, the appointment of veterinarians to boards of health, and their employment by the Army and the Agricultural Department. The latter item, however, was not adopted until a clause calling for "rank and pay of other medical officers" was deleted. In 1872, Stein was successful in obtaining a resolution by the A.M.A. calling for a committee to study diseases "transferrable from animals to man . . . . to prevent the extension of such diseases to man . . . . and what sanitary measures can be effected to arrest the progress of such diseases in animals."

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COMING MEETINGS

Notices of coming meetings must be received 30 days before date of publication.

New York State Veterinary College. Fifty-second annual conference for veterinarians. New York State Veterinary College, Cornell University, Ithaca, Jan. 6-8, 1960. George C. Poppensiek, dean.

Kansas Veterinary Medical Association. Fifty-sixth annual convention. Hotel Broadview, Wichita, Jan. 10-12, 1960. Melvin W. Osburn, 1525 Humboldt, Manhattan, Kan., secretary.

Tennessee Veterinary Medical Association. Annual meeting. Noel Hotel, Nashville, Jan. 10-12, 1960. H. W. Hayes, 5009 Clinton Pike, Knoxville, Tenn., secretary.

Wisconsin Veterinary Medical Association. Winter meeting. Schroeder Hotel, Milwaukee, Jan. 10-12, 1960. W. J. O'Rourke, 1215 Vilas Ave., Madison 5, Wis., secretary.

Nevada State Veterinary Medical Association. Winter meeting. Riverside Hotel, Reno, Jan. 11-12, 1960. Brian L. Hutcherson, 2490 South Virginia St., Reno, Nev., secretary.

Indiana Veterinary Medical Association. Seventy-sixth annual convention. Hotel Severin, Indianapolis, Ind., Jan. 13-15, 1960. L. M. Borst, 3315 Shelby, Indianapolis, secretary.

Iowa Veterinary Medical Association. Annual meeting. Hotel Fort Des Moines, Des Moines, Jan. 19-21, 1960. F. B. Young, Waukee, Iowa, secretary.

Michigan State University. Thirty-seventh annual postgraduate conference for veterinarians. College of Veterinary Medicine, Michigan State University, East Lansing, Jan. 20-21, 1960. W. W. Armistead, dean.

Intermountain Veterinary Medical Association. Annual meeting. Hotel Utah, Salt Lake City, Jan. 21-23, 1960. For information contact: Dr. Douglas H. McKelvie, 1220 South State St., Salt Lake City, Utah, or Dr. R. A. Bagley, 4600 Creek View Dr., Murray, Utah.

Mississippi State Veterinary Medical Association, Inc. Annual meeting. Hotel Heidleberg, Jackson, Miss., Jan. 23, 1960. Joseph W. Branson, P.O. Box 4223, Fondren Sta., Jackson, Miss., secretary-treasurer.

Minnesota State Veterinary Medical Society. Annual meeting. Hotel St. Paul, St. Paul, Minn., Jan. 25-27, 1960. B. S. Pomeroy, University of Minnesota, College of Veterinary Medicine, St. Paul 1, Minn., secretary.

Louisiana State University. Twenty-ninth annual short course for veterinarians. Pleasant Hall, Louisiana State University campus, Baton Rouge, Jan. 26-27, 1960. R. B. Lank, Department of Veterinary Science, Louisiana State University, chairman.

North Carolina Veterinary-Nutrition Conference. Twenty-second annual veterinary conference in joint-session with the North Carolina Feed Industry. College Union, North Carolina State College, Raleigh, Jan. 27-28, 1960. E. G. Batte, chairman.

Ontario Veterinary Association. Annual convention and trade exhibit. Royal York Hotel, Toronto, Jan. 28-30, 1960. W. E. Jolliffe, Suite 102, 97 Eglinton Ave., East, Toronto 12, Ont., registrar.

Ohio State Veterinary Medical Association. Annual meeting. Deshler-Hilton Hotel, Columbus, Jan. 31-Feb. 3, 1960. R. E. Rebrassier, 1411 West Third Ave., Columbus 12, Ohio, executive secretary.

Oklahoma Veterinary Medical Association. Forty-fifth annual meeting. Biltmore Hotel, Oklahoma City, Feb. 1-2, 1960. J. B. Corcoran, P.O. Box 652, Stillwater, Okla., president.

California Veterinary Medical Association. Midwinter conference. University of California, Davis, Feb. 1-3, 1960. Mr. Kenneth Humphreys, 3004 16th St., San Francisco 3, Calif., executive secretary.

Nebraska, University of. Conference on Swine Repopulation. University of Nebraska, College of Agriculture, Agricultural Experiment Station, Lincoln 3, Feb. 3-5, 1960. Inquiries should be directed to: Dr. E. Crosby Howe, Dept. of Animal Pathology and Hygiene, University of Nebraska, Lincoln 3.

American Animal Hospital Association, Region 2. Annual meeting. Robert Meyer Hotel, Jacksonville, Fla., Feb. 6-8, 1960. R. P. Knowles, 2101 N.W. 25th Ave., Miami 42, Fla., chairman.

Colorado State University. Twenty-first annual conference for veterinarians. Glover Veterinary Hospital, College of Veterinary Medicine, Colorado State University, Fort Collins, Feb. 15-17, 1960. O. R. Adams, program chairman.

Illinois State Veterinary Medical Association. Seventy-eighth annual convention. Abraham Lincoln Hotel, Springfield, Feb. 15-17, 1960. C. B. Hostetler, 1385 Whitcomb Ave., Des Plaines, Ill., executive secretary.

Missouri Veterinary Medical Association. Sixty-eighth annual meeting. Hotel President, Kansas City, Mo., Feb. 21-23, 1960. Paul L. Spencer, P.O. Box 283, Jefferson City, Mo., secretary-treasurer.

Foreign Meetings

International Association of Veterinary Food Hygenists. Second Symposium. Basel, Switzerland, May 15-21, 1960. Dr. A. Clarenburg, 1, Sterrenbos, Utrecht, The Netherlands, president.

First International Congress of Endocrinology. Technical University of Denmark, Copenhagen, July 18-23, 1960. Dr. Christian Hamburger, Statens Seruminstitut, Copenhagen S, Denmark, chairman of the executive committee.

Regularly Scheduled Meetings

ALABAMA—Central Alabama Veterinary Medical Association, the first Thursday of each month. James L. Chambers, 4307 Normanbridge Rd., Montgomery, Ala., secretary-treasurer.

Jefferson County Veterinary Medical Association, the second Thursday of each month. Dan P. Griswold, Jr., 714 S. 39th St., Birmingham, secretary.

Mobile-Baldwin Veterinary Medical Association, the third Tuesday of each month. Cecil S. Yarbrough, 4121 U.S. 90 West, Mobile, Ala., secretary.

Northeast Alabama Veterinary Medical Association, the second Tuesday of every other month. Leonard J. Hill, P.O. Box 761, Gadsden, Ala., secretary-treasurer.

ALASKA—Anchorage Group of the Alaska V. M. A., the last Wednesday of each month at Fort Richardson Officers' Club or Thompson's Restaurant, 6th and I Streets, Anchorage, Alaska. Lt. Colonel E. H. Akins, Surgeon's Office, USARAL, Fort Richardson, Alaska, secretary to the Alaska V. M. A.

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ARIZONA—Central Arizona Veterinary Medical Association, the second Tuesday of each month. John D. Clark, 518 West Oak St., Scottsdale, Ariz., secretary.

Southern Arizona Veterinary Medical Association, the third Wednesday of each month at 7:30 p.m. Gwyn Chapin, 2215 E. Calle Vista, Tuscon, Ariz., secretary.

ARKANSAS—Pulaski County Veterinary Medical Society, the second Tuesday of each month. Harvie R. Ellis, 54 Belmont Drive, Little Rock, Ark., secretary-treasurer.

CALIFORNIA—Alameda-Contra Costa Veterinary Medical Association, the fourth Wednesday of Jan., March, May, June, Aug., Oct., and Nov. John S. Blackard, 420 Appian Way, Richmond, Calif., secretary.

Bay Counties Veterinary Medical Association, the second Tuesday of February, April, July, September, and December. Herb Warren, 3004 16th St., San Francisco, Calif., executive secretary.

Central California Veterinary Medical Association, the fourth Tuesday of each month. Paul S. Chaffee, 2333 McKinley Ave., Fresno, Calif., secretary.

Humboldt-Del Norte Counties Veterinary Medical Association, the second Tuesday of January, May, September, and November. Dr. M. Lunstra, P. O. Box 734, Eureka, Calif., secretary-treasurer.

Kern County Veterinary Medical Association, the first Thursday evening of the month. Francis Dawson, 2007 Nile St., Bakersfield, Calif., secretary-treasurer.

Mid-Coast Veterinary Medical Association, the first Thursday of each month. William P. Matulich, P. O. Box 121, San Luis Obispo, Calif., secretary-treasurer.

Monterey Bay Area Veterinary Medical Association, the third Wednesday of each month. V. Todorovic, 47 Mann Ave., Watsonville, Calif., secretary.

Northern California Association of Veterinarians, the second Tuesday of the month. George Crenshaw, 1137 8th St., Orland, Calif., secretary.

North San Joaquin Valley Veterinary Medical Association, the fourth Wednesday of each month at the Hotel Covell in Modesto, Calif. Kenneth E. Erwin, Box 841, Manteca, Calif., secretary.

Orange Belt Veterinary Medical Association, the second Monday of each month. M. C. McSpadden, 2372 West Ramsey, Banning, Calif., secretary.

Orange County Veterinary Medical Association, the third Thursday of each month. H. M. Stanton, 1122 S.E. U.S. Highway 101, Tustin, Calif., secretary.

Peninsula Veterinary Medical Association, the third Monday of the month. R. M. Grandfield, 416 Stephens Rd., San Mateo, Calif., secretary-treasurer.

Redwood Empire Veterinary Medical Association, the third Thursday of the month. R. R. Rediske, 833 Vallejo Ave., Novato, Calif., secretary-treasurer.

Sacramento Valley Veterinary Medical Association, the second Thursday of each month with the location specified monthly. Eugene C. Story, 4819 "V" St., Sacramento 17, Calif., secretary.

San Diego County Veterinary Medical Association, the fourth Tuesday of the month. Robert F. Burns, 7572 North Ave., Lemon Grove, Calif., secretary-treasurer.

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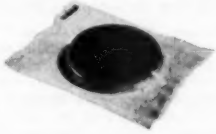

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San Fernando Valley Chapter SCVMA, the second Tuesday of each month at 7:30 p.m., Hody's Restaurant, North Hollywood, Calif. Barbara G. Shirley, Canoga Park, Calif., secretary-treasurer.

San Fernando Valley Veterinary Medical Association, the second Friday of each month at the Casa Escobar Restaurant in Studio City. John Chudacoff, 7912 Sepulveda Blvd., Van Nuys, Calif., secretary.

San Francisco Veterinarians, every other month—meetings decided at previous sessions. J. Wachs, 317D Sacramento St., San Francisco, Calif., secretary-treasurer.

Santa Barbara-Ventura Counties Veterinary Medical Association, every three months, no set date. Gerald M. Clark, 3415 8th St., Carpinteria, Calif., secretary-treasurer.

Santa Clara Valley Veterinary Medical Association, the last Tuesday of the month. Robert L. King, 1269 Grant St., Santa Clara, Calif., secretary-treasurer.

Southern California Veterinary Medical Association, the third Wednesday of the month. Mr. Don Mahan, 1919 Wilshire Blvd., Los Angeles 57, Calif., executive secretary.

Tulare County Veterinary Medical Association, the second Thursday of each month. F. A. Elliott, 2773 Roby St., Porterville, Calif., acting secretary.

COLORADO—Denver Area Veterinary Medical Society, the fourth Tuesday of every month. Gene M. Bierhaus, 2896 S. Federal Blvd., Englewood, Colo., secretary-treasurer.

Northern Colorado Veterinary Medical Society, the first Wednesday of each month, in Fort Collins. E. J. Carroll, Dept. of Clinics and Surgery, Colorado State University, Fort Collins, Colo., secretary.

DELAWARE—New Castle County Veterinary Medical Association, the first Tuesday of each month at 9:00 p.m. in the Hotel Rodney, Wilmington, Del. A. P. Mayer, Jr., R.F.D. 2, Newark, Del., secretary-treasurer.

DISTRICT OF COLUMBIA—District of Columbia Veterinary Medical Association, the second Tuesday evenings of January, March, May, and October. R. B. Gochenour, 10109 Ashwood Dr., Kensington, Md., secretary-treasurer.

FLORIDA—Big Bend Veterinary Medical Association, meets the first Sunday of each month at 5:00 p.m. at the Tallahassee Dining Room, Tallahassee. C. Paul Vickers, P.O. Box 309, Talahassee, secretary.

Central Florida Veterinary Medical Association, the first Friday of each month at 8:00 p.m., place specified monthly. L. R. Poe, 753 W. Fairbanks Ave., Winter Park, Fla., secretary-treasurer.

Florida West Coast Veterinary Medical Association, the second Wednesday of each month at the Lighthouse Inn, St. Petersburg. Fred Jones, 3606 S. Dale Mabry, Tampa, Fla., secretary.

Hillsborough County Veterinary Medical Society, the second Monday evening of each month. For additional information as to the location of each meeting, contact: J. J. Metz, Jr., 5207 Nebraska Ave., Tampa 3, Fla., secretary.

Jacksonville Veterinary Medical Association, the first Thursday of every month. Dodson's Restaurant, Stephen C. Hite, 5807 105th St., Jacksonville 10, Fla., secretary.

Northwest Florida Veterinary Medical Society, third Wednesday of each month, time and place specified monthly. John Webb, P.O. Box 183, Cantonment, Fla., secretary-treasurer.

Palm Beach Veterinary Society, the last Thursday evening of each month. McArthur Dairy Building, Four Points, W. Palm Beach. B. W. Bigger, 2833 S. 4th St., Fort Pierce, Fla., secretary.

Ridge Veterinary Medical Association, the fourth Thursday of each month in Bartow, Fla. John S. Haromy, Route #1, Box 107-A, Lake Wales, Fla., secretary.

South Florida Veterinary Society, the third Wednesday of each month. Time and place specified monthly. Joe B. O'Quinn, 1690 E. 4th, Hialeah, Fla., secretary.

Suwanee Valley Veterinary Association, the fourth Tuesday of each month, Hotel Thomas, Gainesville. G. L. Burch, P.O. Box 405, Ocala, Fla., secretary-treasurer.

Volusia County Veterinary Medical Association, the fourth Thursday of each month. Robert E. Cope. 127 E. Mason, Daytona Beach, Fla., secretary.

GEORGIA—Atlanta Veterinary Medical Society, the third Thursday of each month at the Elk's Home, 726 Peachtree St., Atlanta. Clare L. Bromley, 634 Northside Dr., N.W., Atlanta, Ga., secretary.

Georgia-Carolina Veterinary Medical Association, the second Monday of each month at 8:00 p.m., at the Town Tavern, Augusta, Ga. J. A. Schmitz, 1711 Gwinnett St., Augusta, Ga., secretary.

North Georgia Veterinary Medical Association, quarterly, no set date, the spring meeting at the Veterinary School, Athens, Ga. S. J. Shirley, Commerce, Ga., secretary.

Southeast Georgia Veterinary Medical Association, quarrerly, date and meeting place varies. Hugh F. Arundel, P.O. Box 153, Statesboro, Ga., secretary.

South Georgia Veterinary Medical Association, the second Sunday of each quarter at 3:30 p.m., at the Radium Springs Hotel, Albany, Ga. M. W. Hale, Route 2, Tifton, Ga., secretary.

ILLINOIS—Central Illinois Veterinary Medical Association, June 9, Sept. 9, and Dec. 10, 1959. Paul B. Doby, 4 Owens Lane, Springfield, secretary.

Chicago Veterinary Medical Association, the second Tuesday of each month, Charles H. Armstrong, 1021 Davis St., Evanston, secretary.

INDIANA—Calumet Area Veterinary Medical Association, the first Thursday of each month. Bruce Sharp, Box 166, Hobart, Ind., secretary-treasurer.

Central Indiana Veterinary Medical Association, the second Wednesday of each month. P. T. Parker, 224 N. Mill St., Plainfield, Ind., secretary-treasurer.

Michiana Veterinary Medical Association, the second Thursday of every month except July and December, at the Hotel LaSalle, South Bend, Ind. Stanton Williamson, 217 W. Chippewa St., South Bend, Ind., secretary.

Northwestern Indiana Veterinary Medical Association, the fourth Thursday of each month, except August, January, and February. Harvey R. Smith, R.R. 2, Box 30, Lowell, Ind., secretary-treasurer.

Tenth District Veterinary Medical Association, the third Thursday of each month. J. S. Baker, P.O. Box 52, Pendleton, Ind., secretary.

IOWA—Cedar Valley Veterinary Medical Association, the second Monday of each month, except January, July, August, and October in Black's Tea Room, Waterloo, Iowa. A. J. Cotten, P.O. Box 183, Grundy Center, secretary.

Central Iowa Veterinary Medical Association, the third Monday of each month except June, July, and August at 6:30 p.m., Breeze House, Ankeny, Iowa. S. L. Hendricks, secretary-treasurer.

Coon Valley Veterinary Medical Association, the second Wednesday of each month, September through May, at 7:30 p.m., Cobblestone Inn, Storm Lake, Iowa. Robert McCutcheon, Holstein, secretary.

East Central Iowa Veterinary Medical Society, the second Thursday of each month at 6:30 p.m., usually in Cedar Rapids, Iowa. T. F. Bartley, P.O. Box 454, Cedar Rapids, secretary.

Fayette County Veterinary Medical Association, the third Thursday of each month at 6:30 p.m. in West Union, Iowa. H. J. Morgan, West Union, secretary.

Lakes Veterinary Association, the first Tuesday of each month, September through May, at 6:30 p.m., at the Gardson Hotel, Estherville, Iowa. Barry Barnes, P.O. Box 162, Milford, secretary.

North Central Iowa Veterinary Medical Association, the third Thursday of April, at the Warden Hotel, Fort Dodge, Iowa. H. Engelbrecht, P. O. Box 797, Fort Dodge, secretary.

Northeast Iowa-Southern Minnesota Veterinary Association, the first Tuesday of February, May, August, and November at the Wisneslick Hotel, Decorah, Iowa, 6:30 p.m. Donald E. Moore, Box 178, Decorah, Iowa, secretary.

Northwest Iowa Veterinary Medical Association, the second Tuesday of February, May, September, and December, at the Community Bldg., Sheldon. W. Ver Meer Hull, secretary.

Southeastern Iowa Veterinary Association, the first Tuesday of each month at Mt. Pleasant, Iowa. Warren Kilpatrick, Mediapolis, secretary.

Southwestern Iowa Veterinary Medical Association, the first Tuesday of April and October, Hotel Chieftain, Council Bluffs, Iowa. J. P. Stream, 202 S. Stone St., Creston, secretary.

KENTUCKY—Central Kentucky Veterinary Medical Association, the first Wednesday of each month. R. H. Folsom, P.O. Box 323, Danville, Ky., secretary.

Jefferson County Veterinary Society of Kentucky, Inc., the first Wednesday of each month in Louisville or within a radius of 50 miles, except January, May, and July. G. R. Comfort, 2102 Reynolds Lane, Louisville, Ky., secretary-treasurer.

LOUISIANA—New Orleans Veterinary Medical Association, the third Thursday of every month at the Monteleone Hotel, New Orleans, at 8:30 p.m. Ronald C. Francis, 6421 Chef Menteur Highway, New Orleans, La., secretary-treasurer.

MARYLAND—Baltimore City Veterinary Medical Association, the second Thursday of each month, September through May (except December), at 9:00 p.m., at the Park Plaza Hotel, Charles and Madison St., Baltimore, Md. Leonard D. Krinsky, 6111 Hartford Rd., Baltimore, Md., secretary.

MICHIGAN—Central Michigan Veterinary Medical Association, the first Wednesday of every month at 7 p.m. Jerry Fries, 2070 E. Main St., Owosso, Mich., secretary.

Mid-State Veterinary Medical Association, the fourth Thursday of each month with the exception of November and December. Robert W. Acton, 4110 Spring Rd., Jackson, Mich.

Saginaw Valley Veterinary Medical Association, the last Wednesday of each month. Alvin R. Conquest, P.O. Box 514, Grand Blanc, Mich., secretary.

Southeastern Michigan Veterinary Medical Association, the fourth Wednesday of every month, September through May. Louis J. Rossoni, 24531 Princeton Ave., Dearborn 8, Mich., secretary.

MINNESOTA—Lake Region Veterinary Medical Association, quarterly meetings, with time and place specified prior to each meeting. J. A. Strache, Battle Lake, Minn., secretary-treasurer.

MISSOURI—Greater St. Louis Veterinary Medical Association, the first Friday of each month (except July and August), at the Coronado Hotel, Lindell Blvd. and Spring Ave., St. Louis Mo., at 8 p.m. Edwin E. Epstein, 4877 Natural Bridge Ave., St. Louis 15, Mo., secretary.

Kansas City Veterinary Medical Association and Kansas City Small Animal Hospital Association, the third Thursday of each month at the Hotel President, Kansas City, Mo. Robert E. Guilfoil, 18 N. 2nd St., Kansas City 18, Kan., secretary.

NEVADA—Western Nevada Veterinary Society, the first Tuesday of each month. Paul S. Silva, 1170 Airport Road, Reno, Nev., secretary.

NEW JERSEY—Central New Jersey Veterinary Medical Association, the second Thursday of November, January, March, and May at Old Hights Inn, Hightstown, N. J. David C. Tudor, R.D. 1, Box 284A, Cranbury, N. J., secretary.

Metropolitan New Jersey Veterinary Medical Association, the third Wednesday evening of each month from October through April, except December, at the Irvington House, 925 Springfield Ave., Irvington, N.J. Bernard M. Weiner, 787 Clinton Ave., Newark, N.J., secretary.

Northern New Jersey Veterinary Association, the fourth Tuesday of each month at the Elks Club, Hackensack. James R. Tanzola, Upper Saddle River, N.J., secretary.

Northwest Jersey Veterinary Society, the third Wednesday of every odd month. G. L. Smith, P.O. Box 938, Trenton, N.J., secretary.

South New Jersey Veterinary Medical Association, the fourth Tuesday of each month at the Collmont Diner, Collingswood, N.J. Marvin Rothman, 718 Dwight Ave., Collingswood, N. J., secretary.

NEW MEXICO—Bernalillo County Veterinary Practitioners Association, the third Wednesday of each month, Fez Club, Albuquerque. Donald W. Fitzgerald, 1825 Lomas Blvd., N.E., Albuquerque, N.M., secretary-treasurer.

NEW YORK—New York City, Inc., Veterinary Medical Association of, the first Wednesday of each month at the New York Academy of Sciences, 2 East 63rd St., New York City. C. E. DeCamp, 43 West 61st St., New York 23, N. Y., secretary.

Monroe County Veterinary Medical Association, the first Thursday of even-numbered months except August. Irwin Bircher, 50 University Ave., Rochester, N. Y., secretary.

NORTH CAROLINA—Central Carolina Veterinary Medical Association, the second Wednesday of each month at 7:00 p.m. in the O'Henry Hotel, Greensboro. C. G. Sims, 2450 Battleground Ave., Greensboro, N. Car., secretary.

Eastern North Carolina Veterinary Medical Association, the last Tuesday evening of each month, time and place specified monthly. Byron H. Brow, Box 453, Goldsboro, N. Car., secretary-treasurer.

Piedmont Veterinary Medical Association, the last Friday of each month. J. G. Martin, Boone, N. Car., secretary.

Twin Carolinas Veterinary Medical Association, the third Friday of each month at Orange Bowl Restaurant.

Rockingham, N. Car., at 7:30 p.m. J. E. Currie, 690 N. Leak St., Southern Pines, N. Car., secretary.

Western North Carolina Veterinary Medical Association, the third Thursday of every month at 7:00 p.m. in the George Vanderbilt Hotel, Asheville, N. Car. H. A. Justus, 924 Lakeside Dr., Hendersonville, N. Car., secretary.

OHIO—Cincinnati Veterinary Medical Association, the third Tuesday of every month at Shuller's Wigwam, 6210 Hamilton Ave., at North Bend Road. W. H. Shartle, 323 S. Front St., Hamilton, Ohio, secretary.

Clark County Veterinary Medical Association, meetings held quarterly; time and place irregular. R. Edmondson, South Charleston, Ohio, secretary-treasurer.

Columbus Academy of Veterinary Medicine, the third Thursday of every month, September through May; place irregular. R. W. Vesper, 1481 Doten Ave., Columbus, Ohio, secretary-treasurer.

Cuyahoga County Veterinary Medical Association, the first Wednesday in September, October, December, February, March, April, and May, at 9:00 p.m., at the Carter Hotel, Cleveland, Ohio. R. W. Stockstill, 6545 Mayfield Rd., Cleveland, Ohio, secretary.

Dayton Veterinary Medical Association, the third Tuesday of every month; place irregular. William Pumpelly, 6801 Airway Rd., Dayton, Ohio, secretary-treasurer.

Fifth District Veterinary Medical Association, meetings held quarterly; time and place irregular. E. J. Kersting, 115 Sheffield Rd., Columbus, Ohio, secretary.

Geauga County Veterinary Medical Society, the third Wednesday of each month, at the Manor House, Newberry, Ohio, at 1:00 p.m. Peter J. Clemens, Jr., R. D. 2, Chagrin Falls, Ohio, secretary.

Kilbuck Valley Veterinary Medical Association, the first Wednesday of alternate months beginnig with February; place irregular. Charles Gale, Ohio Agricultural Experiment Station, Wooster, Ohio, secretary-treasurer.

Knox County Veterinary Medical Association, meetings irregular. F. O. Haberman, Centerburg, Ohio, president.

Lorain County Veterinary Medical Association the second Wednesday of April, June, October, December, and February; place irregular. G. W. Bunyan, 37200 Detroit Rd., Avon, Ohio, secretary-treasurer.

Madison County Veterinary Medical Association, quarterly; date and place irregular. James Herman, Mechanicsburg, Ohio, secretary-treasurer.

Mahoning County Veterinary Medical Association, the fourth Tuesday of each month, at 9:00 p.m. Youngstown Maennerchor Club, Youngstown, Ohio. Robert Edwards, 25 Oriole Dr., Youngstown, Ohio.

Miami Valley Veterinary Medical Association, the first Wednesday of December, March, June, and September; place iregular. L. J. Grilliot, Route No. 1, Troy, Ohio, secretary-treasurer.

North Central Ohio Veterinary Medical Association, the last Wednesday of each month, except during summer months; place irregular. Ben Henson, 268 S. Main St., Mansfield, Ohio, secretary-treasurer.

Northwestern, Ohio Veterinary Medical Association the last Wednesday of March and July; place irregular. F. C. Hartman, 3904 Rushland Ave., Toledo, Ohio, secretary-treasurer.

Southeastern Ohio Academy of Veterinary Medicine, every other month; time and place irregular. M. S. Phillips, Athens, Ohio, secretary.

Southern Ohio Veterinary Medical Association, meetings held quarterly at Wilmington; time irregular, S. E. Peterson, 1093 Rombach Ave., Wilmington, Ohio, secretary-treasurer.

Stark County Veterinary Medical Association, the second Tuesday of every month, at McBride's Emerald Lounge, Canton. Robert Leed, 5500 Cleveland Ave., N. W., North Canton, Ohio, secretary-treasurer.

Summit County Veterinary Medical Association, the last Tuesday of every month, excepting June, July, and August, at the Mayflower Hotel, Akron. M. L. Scott, 42 W. Market St., Akron, Ohio, secretary-treasurer.

Toledo Veterinary Medical Association, every other month; date and place irregular. F. C. Hartman, 3904 Rushland Ave., Toledo, Ohio, corresponding secretary.

Trumbull County Veterinary Medical Association, meet three or four times a year; time and place irregular. R. A. Hanawalt, P.O. Box 117, Kinsman, Ohio, secretary-treasurer.

West Central Veterinary Medical Association, third Thursday of February, June, September, and November, at the Lima Club, Lima. K. R. Heidt, 1055 Spencerville Rd., Lima, Ohio, secretary-treasurer.

Wheeling Valley Veterinary Medical Association, meetings held quarterly; time and place irregular. Earl Weaver, 1406 S. Zane Rd., Martins Ferry, Ohio, vice-president.

Miami Valley Veterinary Medical Association, the first Wednesday of December, March, June, and September. J. M. Westfall, Greenville, Ohio, secretary-treasurer.

North Central Ohio Veterinary Medical Association, the last Wednesday of each month except during the summer. R. W. McClung, Tiffin, Ohio, secretary-treasurer.

Northwestern Ohio Veterinary Medical Association, the last Wednesday of March and July. C. S. Alvanos, 1683 W. Bancroft St., Toledo, Ohio, secretary-treasurer.

Stark County Veterinary Medical Association, the second Tuesday of every month, at McBrides Emerald Lounge, Canton, Ohio. M. L. Willen, 4423 Tuscarawas St., Canton, Ohio, secretary.

Summit County Veterinary Medical Association, the last Tuesday of every month (except June, July, and August), at the Mayflower Hotel, Akron, Ohio. M. L. Scott, 42 W. Market St., Akron, Ohio, secretary-treasurer.

Tri-County Veterinary Medical Association, the fourth Wednesday of January, May, and September. Mrs. R. Slusher, Mason, Ohio, secretary-treasurer.

OKLAHOMA—Oklahoma County Veterinary Medical Association, the second Wednesday of every month, 7:30 p.m., Patrick's Foods Cafe, 1016 N.W. 23rd St., Oklahoma City. Claude A. Tigert, 3032 N.W. 68th St., Oklahoma City, Okla., secretary.

Tulsa Veterinary Medical Association, the third Thursday of each month at the City-County Health Building, 4616 E. 15th St., Tulsa, Okla. Arlen D. Hill, 5302 E. 11th St., Tulsa, Okla., secretary.

Tulsa Association of Small Animal Veterinarians, first and third Mondays. City-County Health Dept. R. H. Featherston, 3129 S. Winston, Tulsa 5, Okla., secretary.

OREGON—Portland Veterinary Medical Association, the second Tuesday of each month, at 7:30 p.m. Ireland's Restaurant, Lloyds, 718 N.E. 12th Ave., Portland. Donald L. Moyer, 8415 S.E. McLoughlin Blvd., Portland 2, Ore., secretary.

Willamette Veterinary Medical Association, the third Tuesday of each month, except July and August, at the Marion Hotel, Salem. Robert J. Mallorie, P.O. Box 155, Silverton, Ore., secretary.

PENNSYLVANIA—Keystone Veterinary Medical Association, the fourth Wednesday of each month at the University of Pennsylvania School of Veterinary Medicine. Raymond C. Snyder, N.E. Corner 47th St. and Hazel Ave., Philadelphia 43, Pa., secretary.

Lehigh Valley Veterinary Medical Association, the first Thursday of each month. Stewart Rockwell, 10th and Chestnut Sts., Emmaus, Pa., secretary.

Pennsylvania Northern Tier Veterinary Medical Association, the third Wednesday of each odd numbered month. R. L. Michel, Troy, Pa., secretary.

SOUTH CAROLINA—Piedmont Veterinary Medical Association, the third Wednesday of each month at the Fairforest Hotel, Union, S. Car. Worth Lanier, York, S. Car., secretary.

Georgia-Carolina Veterinary Medical Association—see GEORGIA.

TEXAS—Coastal Bend Veterinary Association, the second Wednesday of each month. Jack E. Habluetzel, Route 1, Box 65-N, Ingleside, Texas, secretary.

Dallas County Veterinary Medical Association, the first Tuesday of each month at 7:30 p.m., at a place to be specified. Frank N. Black, 12830 Preston Rd., Dallas, Texas, corresponding secretary.

UTAH—Salt Lake Small Animal Hospital Association, the first Monday of every month, at the Holiday Inn, 3040 South State St., Salt Lake City, at 12:15 p.m. Douglas H. McKelvie, 1220 S. State St., Salt Lake City, Utah, secretary-treasurer.

AVMA Research Fellowships Available

The Council on Research of the AVMA announces the availability of a number of fellowships for postgraduate training for the academic year, 1959-1960.

The recipient of a fellowship must be a veterinarian and a citizen of the United States or Canada. Veterinary students who expect to graduate at the end of the current school year and who wish to follow a career in research may apply for a fellowship.

The latest date for filing the completed application is Feb. 15, 1960. Approximately one month is required for processing completed applications after receipt by the secretary of the Council. Qualified persons should secure and submit applications as early as possible to insure their file being complete for presentation to the Committee on Fellowships.

The Committee on Fellowships of the Council on Research will meet in March to consider applications, and the awards will be announced soon afterward. The stipend will be determined in each case by the needs of the individual, the location of the school in which he proposes to work, and other factors. In general, the stipends range from $100 monthly and upward.

Any qualified person interested in graduate training may obtain application blanks and other information by writing to Secretary, AVMA Council on Research, 600 S. Michigan Ave., Chicago 5, Ill.

VIRGINIA—Central Virginia Veterinary Association, the second Thursday of each month at 8:00 p.m., except July and August, at a place in Richmond to be announced monthly. Edwin M. Crawford, secretary-treasurer.

Northern Virginia Veterinary Conference Association, the second Tuesday of each month. T. P. Koudelka, P.O. Box 694, Harrisonburg, Va., secretary.

Northern Virginia Veterinary Society, the second Wednesday of every third month. Meeting place announced by letter. H. C. Newman, Box 145, Merrifield, secretary.

Southwest Virginia Veterinary Medical Association, the first Thursday of each month. D. F. Watson, Blacksburg, secretary.

WASHINGTON—Seattle Veterinary Medical Association, the third Monday of each month, Magnolia American Legion Hall, 2870 32nd W., Seattle. Roy C. Toole, 10415 Main St., Bellevue, secretary.

South Puget Sound Veterinary Association, the second Thursday of each month except July and August. B. D. Benedictson, 3712 Plummer St., Olympia, Wash., secretary.

WEST VIRGINIA—Kyowva (Ky., Ohio, W. Va.) Veterinary Medical Association, the third Thursday of each month in the Hotel Pritchard, Huntington, W. Va., at 8:30 p.m. Harry J. Fallon, 200 5th St., W. Huntington, W. Va., secretary.

WISCONSIN—Central Wisconsin Veterinary Medical Association, the second Tuesday of each quarter (March, June, Sept., Dec.) C. R. Carlson, 1109 E. LaSalle Ave., Barron, Wis., secretary.

Coulee Region Veterinary Medical Association, the third Wednesday of every other month. F. N. Petersen, Box 127, Cashton, Wis., secretary.

Dane County Veterinary Medical Association, the second Thursday of each month. Dr. E. P. Pope, 409 Farley Ave., Madison, Wis., secretary.

Milwaukee Veterinary Medical Association, the third Tuesday of each month, at the Half-Way House, Blue Mound Rd. Dr. Raymond Pahle, 10827 W. Oklahoma Ave., Milwaukee, Wis.

Northeastern Wisconsin Veterinary Medical Association, the third Wednesday in April. William Madson, 218 E. Washington St., Appleton, Wis., secretary.

Rock Valley Veterinary Medical Association, the first Wednesday of each month. L. C. Allenstein, 209 S. Taft St., Whitewater, Wis., secretary.

Southeastern Veterinary Medical Association, the third Thursday of each month. John R. Curtis, 419 Cook St., Portage, Wis., secretary.

Wisconsin Valley Veterinary Medical Association, the second Tuesday of every other month. John B. Fleming, 209 E. 4th St., Marshfield, Wis., secretary.

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Names of classified advertisers using key letters can not be supplied. Address your reply to the box number, c/o JOURNAL of the AVMA, 600 S. Michigan Ave., Chicago 5, Ill., and it will be sent to the advertiser.

Wanted—Veterinarians

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Wanted—associate veterinarian in progressive small animal hospital in Fairfield County, Connecticut. Please state experience, references, and salary expected. Apartment available. Address Box S 28, JOURNAL of the AVMA.

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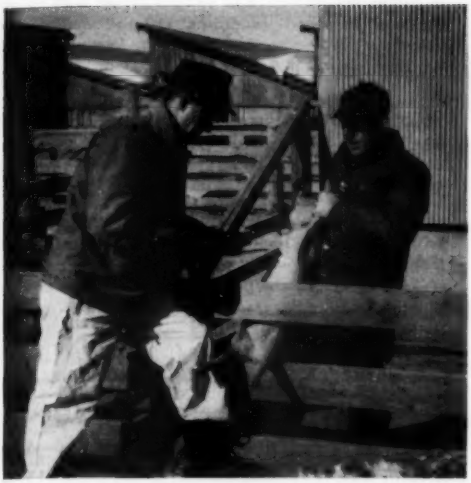

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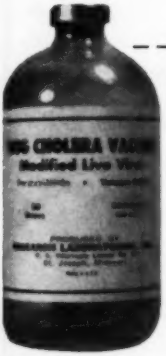

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JOURNAL

of the

American Veterinary Medical Association

Index for Volume 135

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